CEMBER, 1927

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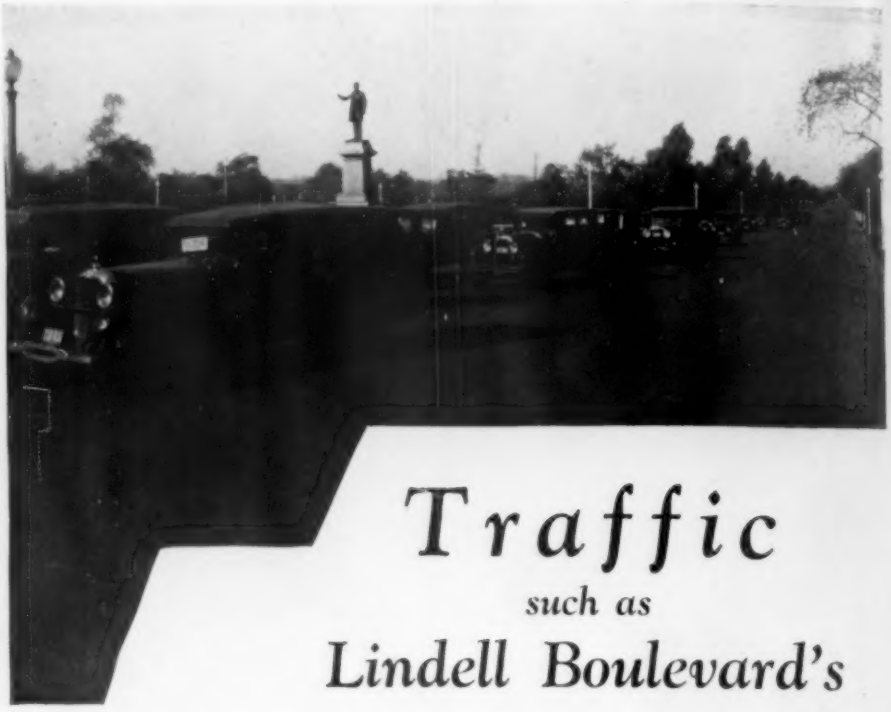

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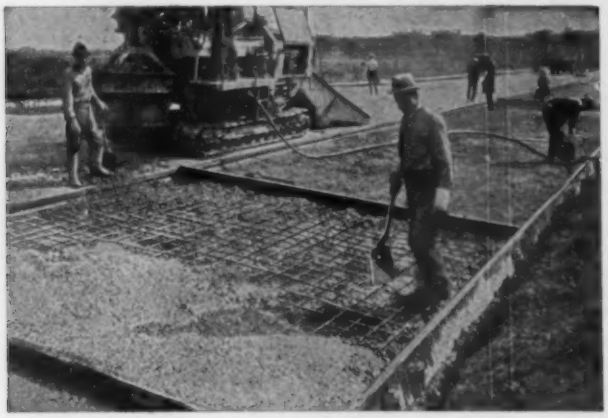

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No. 6

The American City

DECEMBER
1927

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Rational Standards for Materials and Their Use by Municipalities

By C. L. Warwick

Secretary-Treasurer, American Society for Testing Materials

A PARADOX! An age of individualism, yet an age of standardization. Never before have we seen an attempt on such a large scale to produce articles of distinction. Each of us wants a motor car distinctly his own, painted in distinctive coloring and with distinctive furnishings and upholstery. Yet most of us want that car with a standard gear-shift and with the operating pedals in a standard position. And further, most of us want it at a price which is made possible only through extensive standardization in manufacturing operations carried to the smallest detail.

Despite our individualism, we all appreciate the value of standardization, of doing things in a standardized way or of employing standard devices. Railroad transportation, as we know it, is possible only because of standard rail-gages permitting the interchange of railroad cars, and of standard couplings permitting a car of one road to be made a part of a train on any other road.

The idea of standardization has been followed out in innumerable directions and there are still as many opportunities where rational standardization may be employed to advantage. We are just now beginning to appreciate the desirability of having all fire-hose couplings and fittings of one standard, so as to eliminate the confusion existing when a fire company from a neighboring town attempts to assist in combating a devastating conflagration. We are also appreciating the value of having a standard raw or semi-finished material of known properties and characteristics in fashioning any finished structure.

The examples, of, and opportunities for, standardization in the work of municipalities are many. Much standardization has already been effected in design. Simplification has effected many economies. Take paving brick for example. Simplification of paving bricks brought about through the Simplification Division of the Department of Commerce has reduced 66 varieties to 4 and has thereby saved $1,000,000 a year. Reducing reinforcing bars for concrete from 40 to 11 items has saved $4,500,000 annually. Lumber-yard sizes were simplified by 40 per cent, which resulted in a saving, as reported by the lumber industry, of $250,000,000 per year. These instances of simplification are of immediate interest to the municipality.

Standard Specifications

Similarly, corresponding economies may be effected through standardizing materials and buying materials according to standard specifications that are recognized generally in the industries. There is scarcely a branch in the activities of a municipality that is not interested in material purchases. The city builds bridges and roads, water-supply systems and drainage systems. Each year it must construct a number of public buildings, such as schools and offices. Each undertaking requires its quota of engineering materials: cement; reinforcing steel; structural steel; hollow tile; building brick; sewer pipe; drain tile; paving brick; asphalt cement for pavements; stone, slag and sand aggregates for concrete both for buildings and for road construction of all kinds. These

are only a few of the major items, for the municipality is interested in a great variety of construction and there are many materials that must be bought in a large or small quantity: iron, steel, copper and brass pipe; paints and oils of all sorts; waterproofing materials; roofing materials; insulating materials; timber; boiler steels; bar steels; tool steels; fire-hose, and many others.

To buy on specification is nothing new. Practically every Government bureau is convinced of the necessity of issuing specifications in all its purchasing. But the question arises, what specification? In the past, many departments and bureaus have prepared their own, some of the specifications being excellent, others perhaps not quite so excellent. But with every one writing his own specifications, differences naturally existed between them, and multiplicity of specifications always carries with it increased cost of production. It is only through the use of standard specifications that the economies of mass production can be enjoyed.

In recent years the city engineer has turned more and more to the use of standard specifications. At first, perhaps, he bought only cement according to this type of specification. But he has appreciated more and more the value of using a recognized standard specification in his purchases, one which through trial has been found to accomplish the desired purpose of ensuring a satisfactory material and yet being acceptable to the producer as well. Such specifications have become available through the activities of the American Society for Testing Materials. It early recognized the value of bringing the consumer and the producer together on an equal footing to discuss problems relating to materials and to arrive at satisfactory and workable specifications.

Importance of Work of A. S. T. M.

Organized thirty years ago for the specific purpose of promoting the knowledge of materials of engineering and the standardization of specifications and methods of testing, it has become one of the leading standardizing bodies of the country. It is today a national technical society of 4,300 members. The membership is growing in all of the important industries of the country and includes: (1) producers of raw materials, semi-finished and finished products in the metals, cement and ceramics, paints and oils, petroleum products, timber, coal and coke, rubber, textile and other fields; (2) such major groups of users of materials and products as railroads, the shipping industry, automotive industry, electrical manufacturing industry, public utilities, construction and building interests, and federal, state and municipal government departments; and, finally, (3) the so-called "general interest" group, including consulting engineers, testing experts, educators, and technologists and scientists affiliated with Government departments and technical schools. This membership includes 133 municipalities and municipal departments and in addition many individual engineers interested in municipal work.

A. S. T. M. standards are prepared by committees and are issued under definite regulations and a procedure designed to give to those interested in the standard a voice in its preparation and adoption. All committees that are to develop commercial standards are made up of representation from the producers, consumers and general interests. The producer group may not predominate on any committee. It is further required that standards shall be founded on accurate knowledge of the properties of materials.

What Has Been Accomplished in Materials Standardization

The extent of accomplishment in materials standardization is seen in the 515 standard and tentative specifications, methods of test and groups of definitions relating to materials that the Society has developed. These are published in its Book of A.S.T.M. Standards, and its Book of A.S.T.M. Tentative Standards. A condensed list of materials and products covered in these standards is given below:

Structural steel
Spring steel and springs
Reinforcement bars and wire
Steel blooms, forgings and axles
Steel castings
Steel and iron tubes and pipe
Boiler steels
Bar steels
Tool steels
Iron and steel chain
Chemical analysis of steel
Heat treatment of steel objects
Wrought iron
Cast iron pipe
Malleable and gray-iron castings
Chemical analysis of pig and cast iron
Zinc, lead, nickel, aluminum alloys
Brass and bronze
Solder and babbitt metals
Copper and brass plates, pipe, rods
Condenser tubes
Wire and cables
Screen wire cloth
Chemical analysis of non-ferrous alloys
Metallographic testing
Cement, brick, sewer pipe, drain tile
Lime and gypsum
Hollow building tile
Refractories
Concrete aggregates
Reinforced concrete
Paints and oils
Petroleum products and lubricants
Road materials
Coal and coke
Timber and timber preservatives
Waterproofing and roofing materials
Rubber products
Insulating materials

Mention may appropriately be made of the following materials for which specifications and tests are in course of development to-day:

Various metals and metallic products for service at high temperature
High tensile steel forgings
Zinc-coated sheets, wires, pipe and other products
Non-ferrous refrigerator tubing, sheet nickel strip zinc, bronze and other castings, aluminum light-casting alloys
Metallic materials for electrical heating
Paint pigments, shellac, varnish and linseed oil
Naval stores
Tests of petroleum products
Domestic fuel oil
Slate and building stone
Test methods and tolerances for cotton fabrics, rayon, textile goods used in the electrical industry, woolen and knit goods and cords

As will be seen from the list given above, many of the standards are applicable in construction work and are of direct interest to municipalities. Many of them now enter into purchase contracts and in specification work of city and state governments. Take, for instance, the specifications for reinforcing steel. Many cities now require that reinforcement bars conform to the requirements of the A.S.T.M. specifications. The several A.S.T.M. specifications for structural steel cover steel suitable for bridges, buildings and other construction, and are generally used by municipalities.

The standard specifications for cement have universal application. Incidentally, when standard specifications for portland cement were first evolved by the Society, it was considered quite a triumph, for before that time there were literally a hundred and one specifications for this product, each differing in some minor detail from the others but requiring in many instances deviation in manufacturing process or at least separate testing, thus contributing towards increased expense.

Among other specifications that are more or less generally in use by municipalities are those for clay and cement sewer pipe, cast iron pipe, asphalts and tars for road construction, various building units such as brick and hollow tile, and turpentine.

Industrial Significance of Standards for Materials

The benefits of standard specifications to both consumer and producer are many and are so well understood in the industries that the question of the real value of standard specifications requires no lengthy discussion. The following brief summary of these benefits, however, may be of interest. There are general advantages such as result from a thorough knowledge of the properties of a material and its performance in service; from the increased uniformity and reliability of the material; and from the tendency of quality standards to improve the whole output of a commodity of which any considerable portion is purchased according to such standards.

The specific advantages to the consumer:

1. He can secure truly competitive bids on the same quality of material—a condition that is greatly to his advantage.

2. The details of purchasing are simplified and standardized—a matter of especial importance in large organizations, such as the modern municipality.

3. Standard methods of test and inspection are of particular value in establishing a routine procedure for acceptance of material.

4. The greater uniformity and reliability of material purchased under standard specifications, and the fact that its properties are more thoroughly understood, make possible its more economic use.

Of course, standardization has correspondent advantages for the producer which are, naturally, indirectly of advantage to the consumer, among which may be mentioned:

1. He is not compelled to supply, for essentially the same purpose, materials ordered to a variety of specifications that may differ by just enough to require separate production under each specification, involving many classifications in production, in stock piles and the like, with no commensurate benefit to the user.

2. Under standardization, with respect both to dimensional and quality standards, the manufacturer, in times of general business depression when his orders are low and buying is practically at a standstill, can continue to produce "standard" material, knowing that when business picks up there will be a market for it. In this way he keeps his plant running and his organization intact, avoids excessive labor turnovers, prevents large increases of overhead expense in relation to output, can frequently take advantage of favorable market conditions in purchasing raw materials, and in general maintains the efficiency of his operations. Such considerations as these are of great importance in that they substantially reduce the waste in industry, which is an economic burden upon the entire community.

3. The producer knows exactly what he is expected to furnish and how the material will be tested and inspected by the consumer, thus reducing to a minimum the possibility of misunderstandings, which are both vexatious and expensive.

It may be said in general that careful inspection and testing of material is necessary to insure proper deliveries under any specification. Often the manufacturer will furnish a

certified statement that he has tested and inspected the material and that it meets the requirements of the specification, and such a certificate is generally accepted by the buyer as evidence of satisfactory delivery.

Various Ways in Which A. S. T. M. Standards Are Used

The use of A.S.T.M. Standards in industry must rest upon their merits and upon the fact that the very way in which they have been formulated, jointly by producer and consumer, has presumably brought into existence a fair, equitable standard that can be readily introduced to the advantage of both buyer and seller. Their value has been recognized by many city engineers, so that by far the majority of the municipalities are making use of the standards in one form or another. They have been put to use in various ways:

1. They are used without modification.

2. They are used by reference or citation. For example, contracts will require material to conform to certain A.S.T.M. specifications or to be tested in accordance with A.S.T.M. methods, specifying them by title; or the A.S.T.M. standard may be abstracted or quoted in full as a part of such contracts.

3. The standards, where not adopted outright, are used as the basis of specifications written by various units in industry. However desirable it may be to have all interests agree on a single standard where such a thing is possible, the tendency towards individuality in the writing of specifications is a strong one, so that the setting-up of something that can be used as a guide to those who feel they must write their own specifications is a tremendous factor in preventing even greater diversification than exists today. An examination of many of the specifications for materials listed in the Directory of Commodity Specifications shows the undoubted influence of A.S.T.M. standards as the basis of specifications written by other agencies. This same Directory, on the other hand, shows the number of city and state governments specifying A.S.T.M. standards in their entirety.

4. The standards are being extensively used in building and other codes. The laws of the several states and localities differ widely in the extent to which reference can be made in a code to an established standard. In some instances, the reference is quite definite, specifying that material shall conform to A.S.T.M. Specifications C 9-26 for cement, A 15-14 for concrete reinforcement bars, C 34-27 for hollow burned-clay wall tile, etc., with such revisions as may from time to time be adopted in these standards by the Society. In others, while requirements for materials are quoted agreeing in all respects with the specifications of the Society, A.S.T.M. standards are referred to only in regard to the tests to be applied to the materials. A great number of the codes refer to the A.S.T.M. standard tests in this manner.

Standardization Provides Time and Energy for Progress

At least two-thirds of all building codes employ, in one way or another, the A.S.T.M. standards. The codes more recently developed contain the greater number of references to A.S.T.M. standards and are based on these standards to a far greater extent. This is but natural, since many of the codes have stood unrevised for a number of years and it is comparatively recently that the advantages of adopting standard specifications for use in codes has been recognized.

The importance of standardization in relation to future industrial development can hardly be overestimated. Our industries within comparatively recent times have multiplied very rapidly, and not sufficient attention has been paid to the economies that are possible in simplifying types, design and dimensions of commodities, and in standardizing materials and practice. It is only recently that industry has become aroused to the necessity of applying these principles of standardization to problems of production, distribution and consumption. If these principles are properly applied, there need be little apprehension that standardization will weaken the incentive to originate, to invent, and to apply in the industries of the world new types, new materials and new processes—a criticism sometimes directed against standardization. Standardization has been accused of "fixing" practice in such a way as to retard desirable progress in industrial development. This is contrary to experience in the field of materials; what has been found is that the introduction of materials standards has conserved time and energy, otherwise spent on routine matters, for the study of new developments and improvements of the old.

The municipalities of the country, being large users of materials, should benefit no less than other large users by adherence to materials standards in direct proportion to the magnitude of their operations in the field of engineering and construction.

SOME OF THE WRECKED DWELLINGS CAUSED BY THE RECENT STORM IN ST. LOUIS

Restoring a Tornado-swept City

How St. Louis Speedily Put Its Services in Running Order—Reported to THE AMERICAN CITY by Eyewitnesses

THIRTY minutes after the tornado had swept across St. Louis, on the afternoon of Thursday, September 29, Mayor Victor J. Miller was addressing his department heads in a hastily called conference. In a few words he outlined the extent of the disaster from the meager, sketchy reports that had reached him from the stricken area. Decisions were swiftly made; each department head understood what his duty would be, enumerated the facilities at his disposal, and immediately set himself to his part in the task of rescue and rehabilitation. Within an hour, every organized facility of the city was systematically moving into the tornado zone.

One of the greatest immediate problems was the restoration of the street-lighting system. The power lines of the electric company were so badly damaged that it was useless to hope that they could supply the light so greatly needed to carry on the rescue work. This job fell squarely on the shoulders of John C. Pritchard, Director of Public Utilities, George B. Heath, Chief Electrical Engineer, and John W. Brooks, Superintendent of Maintenance.

The city had been rapidly erecting a new type of pole in connection with its $8,000,000 street-lighting program. These poles are of granite composition reinforced with steel and were sold to the city by the Westinghouse Electric & Mfg. Co. with the assurance that they would resist destruction where the ordinary pole would crack. The test of the tornado bore out their assertions.

In the stricken district only 50 out of some 7,500 of these poles were damaged sufficiently to justify replacement. In the web of confusion that marked the path where the wind had passed, only these slender, graceful poles remained upright. Everything else indicated the havoc of the storm. Jagged stumps of telegraph poles pointed skyward; cast iron trolley poles were grotesquely twisted and bent; and great trees, whose roots had clutched deep into the earth, lay prone in the streets.

It was a time when the spirit of St. Louis was made evident through many individuals and organizations. The work of rehabilitation having been officially set in motion, the Street Department, the United Railways Co., the Bell Telephone Co,. the Union Electric Light and Power Co., the Western Union, all did wonderful work, and a high percentage of the credit is due to the men of these particular companies as they worked under extremely dangerous conditions day and night. Furthermore, help was offered from every side. Almost every business house contributed assistance in some way.

Despite every obstacle, the work proceeded.

New poles went up alongside the few broken ones; power cables were re-connected; glassware, replaced. The glassware suffered heavily in the downpour of bricks and flying fragments that accompanied the storm; 1,832 glass units thus destroyed had to be replaced, and 2,458 lamps were required.

The main path of the tornado passed within 500 feet of the Lighting Department maintenance and construction supply house and yards, thereby destroying all telephone and electric light service, leaving the city's main center of operation in darkness and without telephone communication, in a steady downpour of rain.

All orders had to be delivered by couriers in automobiles, which was no pleasant task, as they were compelled to drive over debris and sputtering electric wires and cables. With all of this handicap, by 7 o'clock on the evening of the disaster, the Maintenance Department had mobilized eleven trucks with a crew of four men each. Several of these crews were in the devastated area clearing and cutting away live wires, repairing cables and restoring the lights within one hour after the storm had passed. This force of men worked forty-one hours without relief, except to stop long enough to eat a sandwich and drink a cup of hot coffee.

In lighting District D, which embraced a very large part of the devastated district, all lights were burning the night of the storm except those in the direct path of the tornado, and even in this area many lights had survived general destruction. The maintenance parties of the Lighting Division concentrated in this district immediately after the storm and replaced many lamps before morning.

District C, the north side district, in which there also was much destruction, was in total darkness the night of the storm because of the complete destruction of the high-tension line of the Union Electric Co., which serves the C district substation. The day after the storm the Union Electric mobilized a large force on the reconstruction of this high-tension line, and by 8 o'clock Friday, just thirty hours after the tornado struck the city, practically all the lights were on in districts D and C. By Monday after the storm there were not more than 100 sets of glassware missing among the entire 23,000 electric lamps in the St. Louis street-lighting system.

In some cases uprooted trees tore up the parkway cables, which hindered the city's repair work considerably. But in those sections where the street-lighting system was not thus hampered, the relief work of the Red Cross and allied organizations was carried on under its illumination.

Although the streets were covered with fallen trees, poles, wires and debris from one to several feet thick, the main traffic arteries were cleared and operating the following day. This meant a tremendous amount of night work, as the storm was late in the afternoon. Within the next day almost every street in the district was cleared enough for traffic to move through it. This permitted the removal of household goods, and the trucks used for this purpose were offered by local business houses, in supply greater than demand.

The houses that were not too badly injured have been repaired rapidly. The buildings badly wrecked were of the type built thirty and forty years ago by speculative builders. All those built properly, that is, of 13-inch or even 9-inch brick walls containing the proper proportion of cement mortar and well anchored to the floor system, withstood the storm fairly well.

"Except for a comparatively few buildings at the center of the storm which totally collapsed, and about which nothing can be predicated from the heaps of ruins, the destructive effects of the tornado did not indicate a mysteriously invincible force to which we must simply bow with resignation. It shows that the forces in the penumbral region are well within engineering control and that ordinarily good well-known engineering practice and standards, had they been applied to these buildings, with which, unfortunately, engineers have little to do, would have avoided probably 75 or 85 per cent of the damage."*

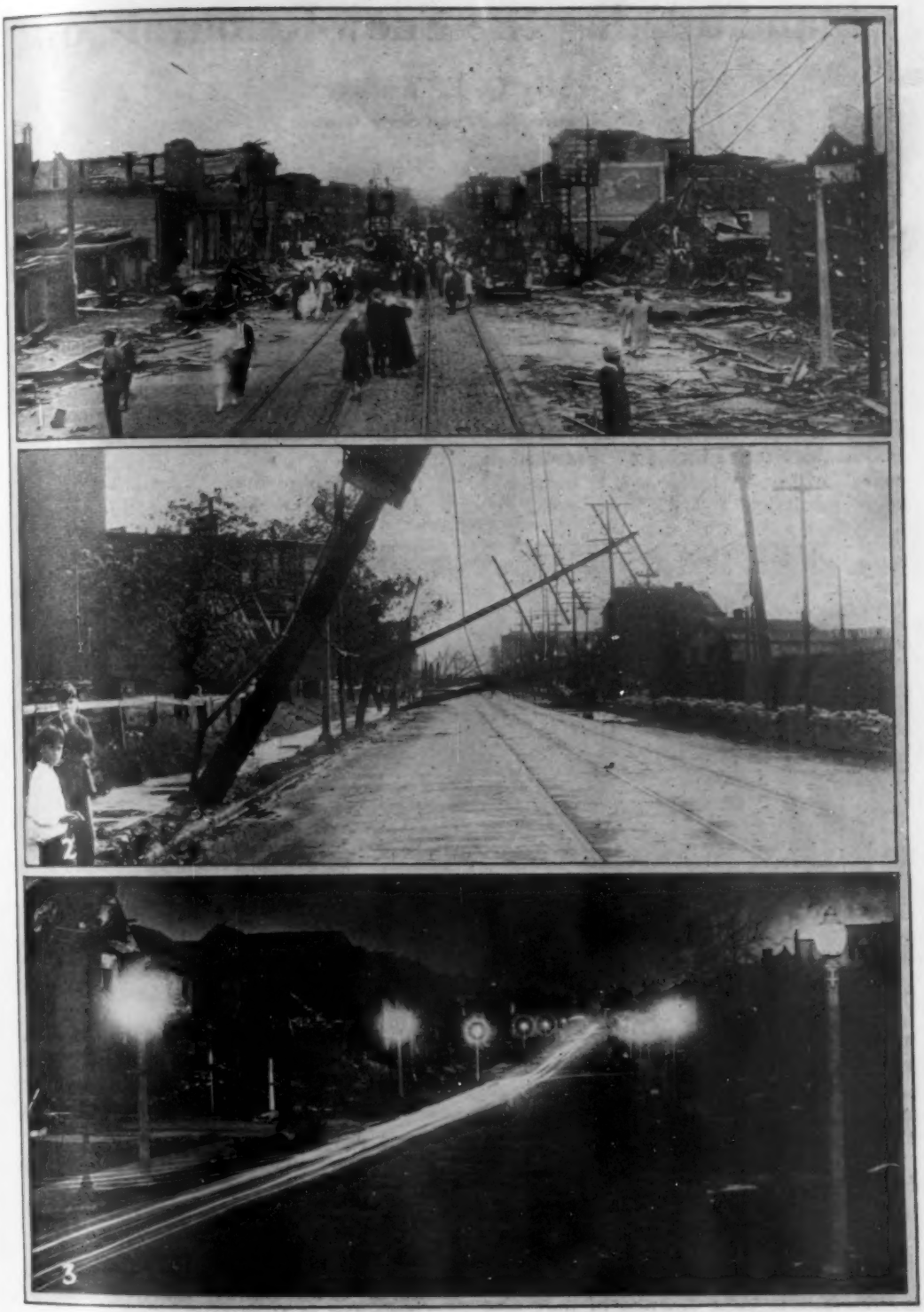
The entire area of the tornado included six square miles of city property. The damage estimated by destruction of property ranges between 70 and 100 million dollars. Seventy-nine persons were killed in the five-minute duration of the tornado, and more than 700 received hospital treatment for injuries. Five thousand or more were rendered homeless by the destruction of their houses.

An interesting sidelight on the spirit of St. Louis is the fact that, in the seven successive days following the disaster, contributions by St. Louisans to the Red Cross relief fund averaged $100,000 a day.

* This paragraph is quoted from the mimeographed notes, dated October 23, 1927, made by Louis N. Beals, Jr., Chief Engineer, Division of Buildings and Inspection, St. Louis. Others whose observations are quoted in this article are: Robert B. Brooks, Director of Streets and Sewers; Edward E. Christopher, Building Commissioner; Geo F. Smith, and A. B. Murphy, all of St. Louis.

The Value of a City Plan When Disaster Strikes

will be the title of an illustrated article by Harland Bartholomew, City Plan Engineer of St. Louis, to appear in THE AMERICAN CITY for January.



TORNADO-SWEPT STREETS OF ST. LOUIS AFTER THE DISASTER OF SEPT. 29

1. A scene of wreckage
2. Telephone poles that could not stand the strain
3. Some of the lighting standards that remained upright and continued their service during the relief work

Standardizing the Snow-Removal Job

By G. E. Wallis

Director, Bureau of Snow Control

GOOD news for motorists and other users of our public highways is the estimate of H. G. McKelvey, of the Federal Bureau of Public Roads, that 117,000 miles of highway in snow-belt states will be kept free from snow this winter. Comparison of this estimate with the 1922-23 accomplishment of 27,000 miles of snow-free roads indicates that five years' work has brought a vast improvement in winter highway travel.

While it is general to the entire snow-belt region, the snow-removal problem is essentially local in character and solution. Standardizing methods of keeping roads clear from snow the winter long might at first glance appear to be impossible because of the uncertainty of snowfall density. The problem is not so difficult, however, when it is separated into what might be called the sub-problems with solutions in each case.

Snow removal is a state job as well as a county and municipality responsibility. Closed roads interfere with business. Closed roads interfere with the use of a public utility in which millions and billions have been invested. To invest millions in a state's highway transportation system on a program of only nine months' free use seems uneconomic in principle, yet it is a fact that two states in which snow is a vital winter factor have not included in their highway legislation any means of appropriating money even for snow shovels to keep a single foot of state highway open in winter.

Many states, however, are making excellent progress, and the public is reacting strongly to the idea of year-round use of the public pike. One Illinois district engineer two years ago experimented with organized snow patrol on several highways. The results were highly praised. Today, appreciation has turned into complaint wherever snow clogs a highway even for short periods.

Typical State Organization

Snow-removal work has been highly organized in many states, and adaptations of the state plans are being successfully applied by counties and cities. Typical of the type of efficient state organization which has developed along with the increased demand for adequate highway snow control is that of the Connecticut State Highway Department.

A WALTER SNOW FIGHTER TEARING THROUGH DEEP SNOW AT 20 MILES AN HOUR

The Connecticut plan is described in detail in a report of the Bureau of Public Roads:

"The snow-removal work in this state is controlled by eleven District Supervisors under a Superintendent of Maintenance. Each district organization is composed of the necessary foremen, men, and equipment. The highly efficient personnel has been instructed to begin snow removal as soon as the roads have become covered to a depth of two inches. This amount of snow starts the or-

ganization to work automatically, without any further instructions from headquarters. The men assemble, according to a predetermined plan, at the various storage sites of the equipment; and if any fail to report for duty on time, it means the loss of their position with the Highway Department, unless they are able to give a reasonable excuse for their absence.

"The location of each outfit is recorded with large flat-headed pins on a state map hung on the wall of the headquarters office. On each pin there is a number which indicates the make, power and condition of the truck, and the description of the plow attachment. The equipment allotted to the various districts is intended to be adequate for normal conditions, but it often happens that a heavy snowfall which exceeds the capacity of the equipment occurs in one district while the surrounding regions are affected by little or no snowfall. In this case the personnel of the snow-free districts are directed by the superintendent to proceed to the assistance of the crews in the heavy-snowfall area. This help is not delayed until the overtaxed district is snowed in, but careful watch is maintained by the headquarters office, and the relief units from the surrounding districts are hurried to the scene before the local crews have lost control of the situation. As the various units are moved to their new temporary locations, the pins on the headquarters map are shifted accordingly.

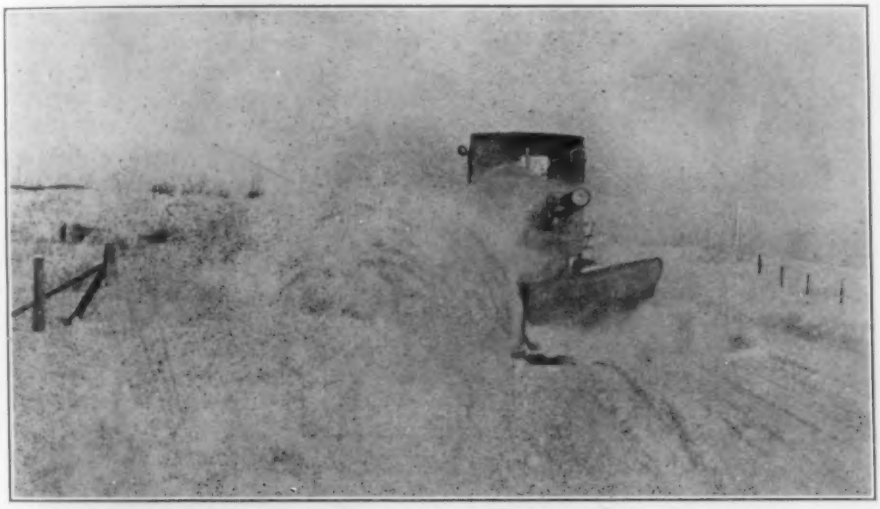
"Snow removal, in the states that have been actively engaged in this service on their main highways, requires no further promotion. Open roads for the winter traffic have been sold to the traveling public, and they look upon the cleared highway in the winter as a necessity and expect this service to continue with the same regularity as the maintenance of the surface during the remainder of the year. Once begun, the size of the program is seldom curtailed from year to year unless it is reduced by open winters in isolated sections. Usually, the only question raised is: How much can the mileage of cleared roads be increased during the next winter with the available equipment and funds? One of the New England states, of relatively small area, but with a snow-removal program of 1,900 miles, reports that in one winter the maintenance office received some 2,000 telephone inquiries as to whether certain roads were open or passable; but that no such calls were received last winter. The traveling public has come to expect the main roads to be open and serviceable and no doubt found them in that desirable condition.

Snow-Removal Procedure

Procedure in keeping snow under control is now fairly well established and is followed quite generally by states and counties as follows:

To keep the roads open means that a well-established organization must begin to work along definitely planned lines *before the first snow falls.* In general, the procedure is divided as follows:

1. Pre-snow activities



AN ILLUSTRATION OF THE ADVANTAGE OF USING TRUCKS FOR SNOW-REMOVAL WORK
With slower equipment the V-plow would only break a road open through the snow. This truck, however, equipped with a V-plow, is actually throwing the snow off the road. This can be accomplished only when the equipment is traveling at a good speed.

2. Snow fighting during the storm
3. Snow removal after the storm

The pre-snow activity consists in making a survey of the section to be controlled, plotting the possible trouble points where drifts can be expected, eliminating such points by new construction if possible, removing plant growth obstruction, and erecting snow-fences at strategic points. The success of such work depends, of course, upon local observation. The engineers should know a good deal about the meteorological and topographical character of the territory. They should know from previous years just where drifts are likely to occur, and they should have some experience with proper methods of snow-fencing.

In former years where snow-fencing was practiced it was relied upon as the chief means of preventing heavy accumulations of snow on the roads. This, of course, is a fallacy, for snow-fences in themselves are almost useless as an effective means of fighting snow. They should form only the preliminary part of a true snow campaign. The enlightened snow-control program goes into action with the first snowfall and continues from that point on. In many sections, the practice is to begin the operation of speed equipment when two inches of snow have fallen. This equipment usually consists of trucks operating blades or light plows at a speed of twelve to fifteen miles an hour. These trucks patrol the road as fast as possible during the storm, keeping the road open at all times and preventing too heavy accumulations on the surface. Of course, the preliminary equipment opens only a narrow channel and banks the snow high along the sides. While it succeeds in keeping a path open for traffic, it does not accomplish the end of complete snow removal. This object is left to the heavier equipment, which begins operation either during or after the storm, "cleaning up" the work of the preliminary equipment. The final operation consists in removing all banks and drifts, opening the full width of road and eliminating the snow as a possible trouble factor in future storms.

THE RESULT OF IMPROPER SNOW REMOVAL: MELTING SNOW IN SPRING SOFTENED THE SUBGRADE, UNTIL THE ENTIRE ROAD WAS A MIRE

The cost of repair in this case was far greater than that of snow removal would have been

OPENING ONLY A NARROW LANE INSTEAD OF CLEARING THE WHOLE ROAD LEADS TO MANY EVILS, INCLUDING STALLED TRAFFIC AND DAMAGED ROADS

Rotary Plow Important

The most efficient equipment for such operation has been the subject of much contention among engineers. In general, the motive power is a heavy truck or tractor which operates either a large push plow or a rotary plow. The respective merits of the rotary and the push blow is at present a bone of contention, and although both types are widely used, it seems probable that in the next two or

A ROAD GRADER PRESSED INTO SERVICE FOR THE REMOVAL OF LIGHT SNOW ACCUMULATIONS

Such equipment is useful during storms

three years engineers will standardize upon some form of snow-throwing plow.

Although such points are still debatable, it seems well established that the successful snow control must be developed along lines of three general activities. This plan is being followed in Connecticut and Michigan, and several other states that have been noticeably successful in controlling snow and keeping roads open in winter. It is recommended by various engineers and governmental bodies as the most efficient and most economic method of handling snow.

Snow Removal as Road Maintenance

One of the interesting developments of snow-removal work in this country has been the discovery of an important effect upon the general problem of road maintenance. It has been found, in sections where snow removal is practiced successfully, that snow removal has a highly beneficial result upon the general condition and the life of the road.

One of the most costly factors in road maintenance heretofore has been the damage and destruction caused during the spring break-up period to flexible surfaced roads. The melting snows would undermine both the surface and the subsoil; traffic would move in ruts, causing deep cuts in the road surface, and sometimes necessitating complete rebuilding of sections of the road. It has been found, however, that where the road is kept clear of snow during the winter, this damage is largely prevented. The cost of reconditioning the road is very much less. In fact, many sections claim that the actual saving in spring maintenance more than offsets the complete cost of snow removal.

We see, therefore, that snow removal is not only a means for maintaining winter traffic, but also a necessary part of road maintenance. It helps to protect our tremendous investment in roads by decreasing the causes of their break-up and increasing the length of life of the road. This factor of maintenance has greatly increased the engineering interest in the subject of snow removal, and will undoubtedly exercise an influence in spreading it to all snow states.

Snow Removal for 1928

In 1922-23, 27,000 miles of road were controlled at an average cost of $28.12 per mile. Since that time the mileage has steadily increased, until for the season of 1926-27 there were about 106,000 miles of road under snow control and the average cost per mile was $43.50. Although the cost per mile has increased in that period, this is not due to any increase in the actual cost of moving snow. It is due to the fact that complete snow removal is now practiced, whereas in the year 1922, emergency lanes were considered efficient snow removal. Naturally, the opening of the whole road is more costly than a mere emergency lane, but the benefits of such improved snow removal far offset the increased cost per mile. All indications point to a greatly increased mileage under control for the period 1927-28. Where snow control has been practiced effectively, the public whole-heartedly endorses the snow removal and insists upon its spreading to secondary and even minor roads. The problem of financing snow control in these sections is not a difficult one. Through the gasoline tax, snow removal may even finance itself because of the increased consumption in gasoline due to increased travel.

Improved Street Design Will Relieve Traffic Congestion

STUDIES made by the Erskine Bureau for Street Traffic Research have shown that cities can reduce the amount of congestion on heavily traveled streets by improved street design. Often a city that considers itself in need of new streets to handle the increased volume of motor-vehicle traffic, can materially increase, and sometimes even double, the capacity of existing streets through minor physical improvements, well within its financial capacity.

Often there are a few well-paved streets crowded to the point of acute congestion, paralleling poorly paved streets that are practically deserted. Improving the pavement of these parallel routes virtually doubles the capacity of the existing well-paved streets by tending to divert much of their traffic.

A high-crowned street often carries only half its traffic capacity because drivers tend to stay off the sloping sides and drive as near the center as possible. This not only reduces the volume the street can carry, but slows traffic by making it hard for overtaking vehicles to pass.

Depressed gutters present dangers to moving traffic, and drivers tend to keep away from them. Depressed cross-gutters or raised crosswalks at intersections may often render a street practically useless if there are parallel streets which are more comfortable for drivers to use. The necessity of slowing down to avoid bumps discourages the use of such streets.

The typical right-angle curb at intersection is another factor that limits traffic capacity of the streets. Motor cars seldom turn on a radius of less than 20 feet, and must make unnecessarily wide swings in rounding corners, thus reducing the number of usable traffic lanes.

Practically all of these faults in roadway design have been eliminated in modern highway construction. Flat surfaces, smooth shoulders, long, easy curves, are now the general practice. Much traffic relief would result if highway design were more generally applied to city streets.

MILLER McCLINTOCK,
Albert Russel Erskine Bureau for Street Traffic Research.

Types and Costs of Paving on Steep Grades

New York State Practice Where Grades Are 5 Per Cent or Greater

A RECENT report of the New York State Bureau of Municipal Information gives the standard practice in a large group of cities regarding the type of paving used on streets with a grade of 5 per cent or greater:

Auburn.—Practice has been to use brick up to about 6 per cent; for steeper grades Medina sandstone block. On one grade of about 6 per cent, pavement is asphalt with sandstone block strip along sides of street.

Amsterdam.—Recent practice is the use of concrete pavement with corrugations. Have used hillside vitrified brick on some streets where property owners desired such pavement. Cost of concrete, including excavation, but not including curb, $3.45 per square yard; hillside brick, $5.80 per square yard.

Binghamton.—On heavy-traffic streets hillside brick is used. One street laid some time ago is of plain brick. Cost of hillside brick, $5.35 per square yard; Warrenite bitulithic, $3.70 per square yard.

Beacon.—Only one street of over 5 per cent grade where a permanent pavement has been laid. This street is of concrete.

Dunkirk.—Surface modified with hillside brick to assist horse-drawn vehicles; price $3.60 per square yard.

Elmira.—No smooth-surfaced pavement used. Brick used in most instances: Last hillside brick job cost $4.63 per square yard, including excavation, asphalt filler and 5-inch concrete base.

Geneva.—Stone block or hillside brick used. Cost of hillside brick pavement $5.00 per square yard; stone block, $6.50 per square yard.

Hudson.—No change in type up to 8 or 10 per cent. Cost of concrete pavement $3.50 per square yard; brick, $5.00 per square yard.

Jamestown.—Hillside brick used for grades of 6 per cent or more; common block for less than 6 per cent; $3.68 per square yard.

Lockport.—Brick used, cost including curbing, $3.75; hillside brick, $2.33; concrete base and cushion, $1.42.

Little Falls.—Uses stone block, hillside brick, plain and grooved concrete. Has one street with bitulithic on a 9.3 per cent grade; $3.60 per square yard is grooved concrete.

Middletown.—Concrete or brick used; cost of concrete, $4.00 per square yard.

New York City, Borough of the Bronx.—Bituminous concrete and asphalt block, 4 to 9 per cent granite block for 9 per cent or over. Cost of bituminous concrete, $4.16 per square yard; 3-inch asphalt blocks, $5.02; granite blocks, asphaltic joints $6.57.

Oneonta.—On residential streets asphalt is used, and granite block on business streets. Cost of 2-inch sheet asphalt on 6-inch concrete base, including excavation, $4.71; granite block on 8-inch concrete base, including excavation, $10.98.

Olean.—Four-inch hillside brick used, cost $3.85 per square yard.

Poughkeepsie.—No fixed rule, type depending on traffic and location of street. Cost of granite, $8.79 per square yard; brick, $6.00 per square yard; reinforced concrete, $3.55 per square yard; asphalt, $3.50 per square yard.

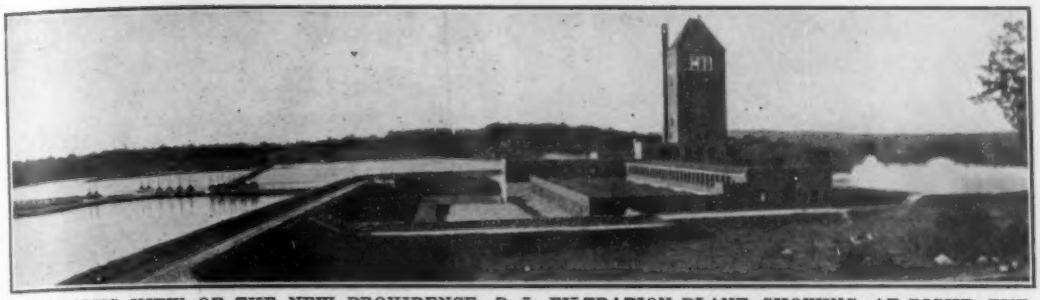
Schenectady.—Full width or in some cases a 10-foot width paved with block pavement surface. Corrugated reinforced concrete has also been used. Cost of granite block, Hassan size, $8.10 per square yard; hillside block, $5.95 per square yard; reinforced concrete, 7-inch, $3.45 per square yard.

Syracuse.—On portland cement concrete pavement, the concrete is grooved; with other types of pavement a strip of hillside brick or sandstone block is laid in the center of the street. The width of this strip ranges from 9 feet to one-third the width of a pavement wider than 27 feet. On grades over 12 per cent the hillside or sandstone is laid for the full width of the street. Hillside brick with 8-inch base costs $5.00 per square yard; sandstone block with 8-inch concrete base, $6.00 per square yard; grooved portland cement concrete, 7-inch, $2.80 per square yard.

Troy.—Uses granite block where traffic is heavy; otherwise, asphalt or bitulithic up to 7 per cent; above this, granite, hillside brick or macadam.

Watertown.—Concrete and bituminous pavement. Concrete, including excavation costs $3.50 to $4.50 per square yard; brick discontinued on account of excessive cost in this locality.

Tarrytown.—Bituminous macadam used and found satisfactory on 18 per cent grades; costs $2.00 per square yard; 8-inch reinforced concrete costs $3.95 per square yard.



PANORAMIC VIEW OF THE NEW PROVIDENCE, R. I., FILTRATION PLANT, SHOWING, AT RIGHT, THE RAW WATER AERATORS, THEN THE TWO BANKS OF FILTERS WITH CHEMICAL STORAGE AND LABORATORY TOWER IN BACKGROUND, THEN THE FILTERED WATER AERATORS, AND AT THE LEFT THE SETTLING-BASIN FOR RAW WATER

The First Year's Operation of the Providence Filtration Plant

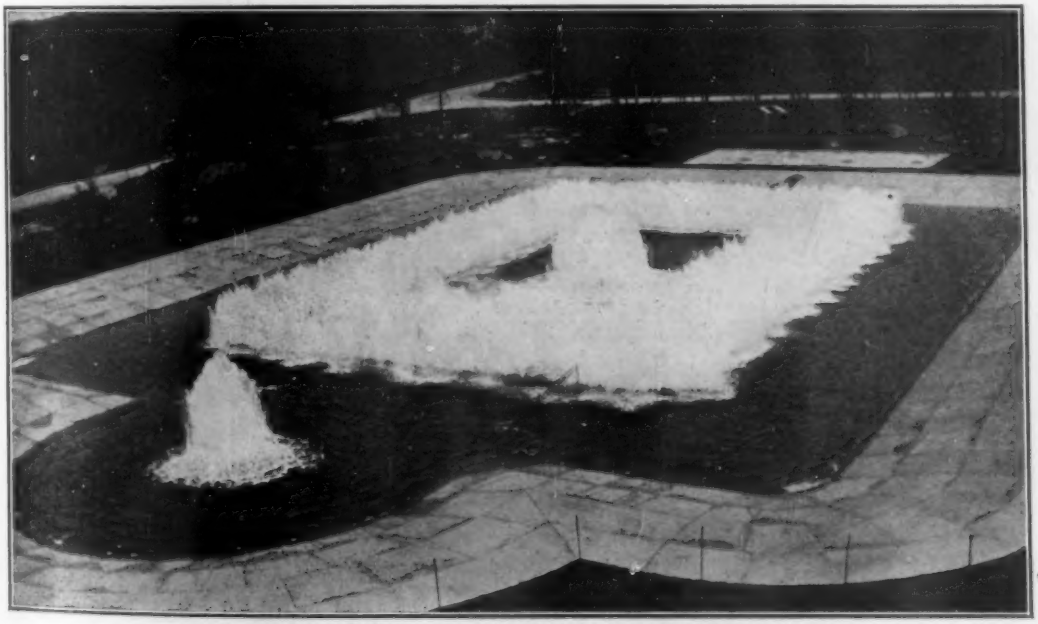
By Julius W. Bugbee and Elwood L. Beam

City Chemist and Resident Chemist, Filtration Plant, respectively, Providence, R. I.

THE new Scituate project of the Providence water-supply consists of a catchment area of 92.8 square miles, 25 per cent of which is owned by the city, an impounding reservoir covering 5.6 square miles, with a storage capacity of 37 billion gallons, a hydro-electric plant to utilize water sent to the mills downstream, purification works, an aqueduct built partly in tunnel and partly in cut-and-cover, steel and reinforced concrete pipe lines, and two covered distributing reservoirs.

The purification works consist of an influent aerator, a head-house for storage and application of coagulant, a rotary mixer, two coagulating basins of 31 million gallons and 94 million gallons respectively, ten rapid sand filters with a rated capacity of 48 million gallons per day, an effluent aerator, and a chemical house for the storage and application of lime and chlorine.

The plant was put in operation on September 30, 1926, six filters having been completed at that time, and 19 billion gallons having been



INFLUENT AERATOR AT PROVIDENCE FILTRATION PLANT

CONTROL TABLES FOR OPERATING FILTERS

stored in the reservoir. The surface elevation of the reservoir had reached 265, or 16 feet above the surface of the sand in the filters. The south coagulating basin was still uncompleted, and the north basin, having a capacity of 31 million gallons, was used alone until February 1, 1927. Filters 7, 8, 9, and 10 were completed and put in service between September 30 and January 1, 1927. Until all construction contracts were completed the plant was operated by the Water Supply Board, and the formal transfer to the Department of Public Works was made on July 3, 1927. The power plant is still being operated by the Water Supply Board, and electric current is sold to the Department of Public Works.

Preliminary studies of treatment methods were handicapped by the fact that no water had been stored in the reservoir, and the character of the water to be treated was therefore problematical, depending on the proportions received from the various tributaries, and the effect of storage in a new, unstripped reservoir. Numerous experiments were conducted, using samples of water from the ponds and streams in the drainage area with various amounts and combinations of chemicals, with and without aeration, and a course of treatment was laid out, which has been successful in meeting the conditions actually encountered during the past year.

The intake at elevation 235 to 240 has been used during the entire year. The surface level has varied between 263 and 278, or 25 to 40 feet above the intake, which is itself 40 feet above the bottom level at that point. This intermediate level has appeared to be the most desirable, as the distance from the surface insures freedom from ice troubles in winter and avoids most of the micro-organisms in summer, while, on the other hand, iron and color are lower than if the water were taken from the extreme depth.

Carbon Dioxide and pH

Carbon dioxide content of the raw water has varied between 2 and 9 parts per million. Starting at 5 parts in October, it increased to 6 parts in November, then slowly decreased to 3.5 parts in December, again increasing during the colder weather to a maximum of 8.5 parts in late January, followed by a slow decrease to a minimum of 2 parts in early May, with another increase to 9 parts in early August. Removal of CO_2 has varied with the variations in the raw-water content and with the temperature. With the raw-water temperature below 50 and the air temperature below 60, in February, March and April, aeration reduced the CO_2 from 8 parts to 5 parts, from 6 parts to 4 parts, and from 4 parts to 3 parts, but when only 2 parts were present in late April and early May, the reduction was 0.3 parts. In May, June and July, with water temperatures between 50 and 60, and air temperatures between 50 and 80, greater removal of CO_2 was obtained, averages showing reductions from 8 parts to 4 parts, 6 parts to 3.2 parts, and 4 parts to 2.5 parts.

The changes in $_pH$ due to aeration have corresponded closely with the changes in CO_2. Raw water of 6.1 has been raised to 6.4; 6.5 to 6.8; 6.7 to 6.9; and 6.9 to 7.0.

Efficiency of aeration is affected somewhat by the different rates of operation. With the reservoir at 278.50, the maximum height reached during the year, the height of spray can be made to vary between 7 and 15 feet, depending on the number of sets of nozzles in use. With the reservoir at this height, it is possible, by using a single set of nozzles, or various combinations of two, three or four sets, to obtain fifteen different rates of discharge, varying from 20 million to 85 million gallons per day.

Experiments have established 5.8 as the optimum $_pH$ for coagulation of this water, with a good floc formation and color removal as low as 5.4, but with alum present in the filtered water when the $_pH$ of the treated water was below 5.7. Both experimental and actual work have shown that with alum alone for a coagulant, proper floc formation will not take place above $_pH$ 6.2. In operation, the $_pH$ of the

treated water has been maintained between 5.7 and 6.2.

In a series of experiments performed in January, with water of $_pH$ 6.5, color 30, and alkalinity 5, an excellent floc was formed with 0.7 grain alum per gallon, while the addition of 0.1 grain of CaO in the form of hydrate increased the amount of alum required to 0.9 grain, and with 0.16 grain of CaO, one grain of alum per gallon was necessary.

Alum Specifications

Alum used during the year has been purchased under a specification which requires that all dust and fine particles which will pass a screen having 10 meshes per linear inch shall be screened out, and that no particles shall be larger than will pass a three-quarter-inch screen. This grade of alum has been found to give better results in the dry-feeding machines than the finer grade usually employed, all of which passes a 4-mesh screen, and 95 per cent of which passes a 10-mesh screen. The entire freedom from dust is also a desirable feature, both in cleanliness of the building and in comfort of the operators. Deliveries have been made in 175-pound bags, which are opened and dumped into the bucket conveyor that elevates the alum to the storage bins on the fifth floor.

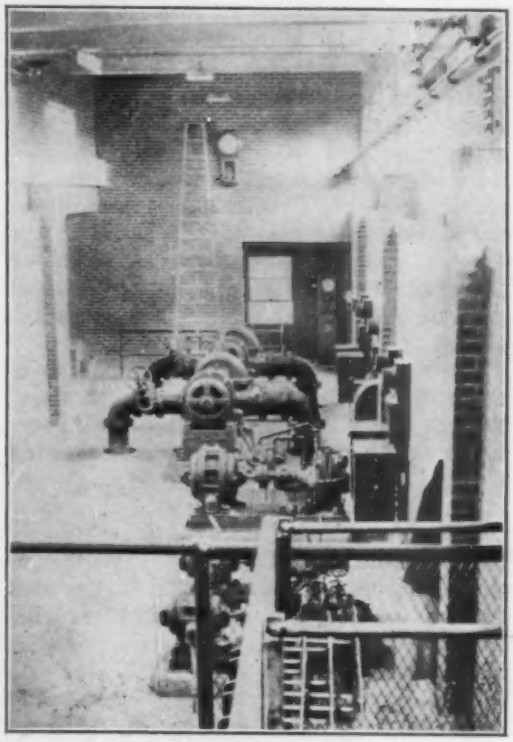
Mixing of alum solution and aerated raw water is accomplished in a circular tank 35 feet in diameter and 30 feet deep. The treated water enters tangentially at the bottom, and discharges at the top, into the north coagulating basin. Samples taken from the outlet end of this mixer, and compared with samples of water subjected to violent shaking by hand, indicate that thorough mixing is accomplished in this manner. The alum dosage has varied from 0.7 to 0.5 grain per gallon except in November and December, when 1.0 grain per gallon was applied.

Filter Runs

During the four months in which the small coagulation basin only was in service, the length of filter runs varied between 4 and 25 hours, with an average of only 13 hours. Since the second basin was put in service, no run has been less than 11 hours, with a maximum run of 68 hours; average for a six-months period being 29 hours. Just before putting the second basin in service the average of filter runs was 10 hours. Five days later an average of 46 hours was reached, which was maintained for the remainder of the month. This was without change of $_pH$ or temperature of water on the filters.

Efficiency of Filter Washing

In February, with the filter temperature averaging 36° F., slightly longer runs resulted from a 16-inch wash for three minutes than from washes at other rates. With the temperature at 42 to 50° in April, the longest runs followed washes of three minutes at nineteen inches, giving a sand expansion of 35 to 40 per cent. In May, average runs of 30 hours or more followed washes with 30 to 35 per cent expansion, while less than 25 hours' average was obtained with over 40 per cent expansion. With a filter temperature of 60 to 65° in June, it was found that while washes of 25 to 27 inches (sand expansion 35 to 40 per cent) resulted in slightly lower initial loss of head than washes of 20 inches (sand expansion 20 to 25 per cent), the length of runs was not increased, the loss of head increasing more rapidly during the first few hours of the run. A tendency to form mudballs while washing at these higher velocities was also noted. In July the average run of filters washed at 20 per cent expansion was 10 per cent more than those washed at 30 per cent expansion. These results seem to indicate that the percentage sand expansion necessary to secure maximum length of filter runs is not constant, but varies between 20 and 40



PUMP-ROOM AT THE PROVIDENCE FILTRATION PLANT, SHOWING THE TWO WASH-WATER PUMPS, ONE HIGH-PRESSURE PUMP AND TWO SERVICE PUMPS

per cent.

Length of wash of less than three minutes (calculated as the time between opening and closing the controls) has at all times proved to be insufficient, while washes of more than three minutes have shown little or no advantage. Two minutes from time of opening the hydraulic controls for the wash-gates is required before maximum expansion of the sand is reached. A 3-minute wash calculated as mentioned allows 2 minutes of maximum expansion of the sand, with a total time of flow of 4¼ minutes.

When expansion reaches 40 per cent, some sand is lost, while at 50 per cent expansion it would waste very rapidly. The original depth of sand placed in the filters was 30 inches, and there has been a constant decrease in depth, with an increase in effective size. The average depth of sand on December 1, 1926, with seven beds in operation, was 28.8 inches, with an effective size of 0.37 millimeter. On August 1, 1927, the average depth had decreased to 27.3 inches, while the effective size had increased to 0.40 millimeter. The losses of sand had been so distributed among the various sizes that the uniformity coefficient remained practically constant at 1.45.

Filter Operation

Each filter has a sand area of 1,738 square feet, which is divided into two equal parts by a water conduit (influent and drain) midway of the filter, and extending above the tops of the wash-troughs. Each half has its own and entirely independent controls for all operations, except the influent and drain-gates. The filters were designed for a capacity of 4.8 m.g.d. or 2.4 m.g.d. on each half, but are being operated at a rate of 2.2 m.g.d. per half bed, equivalent to 110 m.g. per acre per day.

The rate of operation of each half filter is regulated by a controller equipped with a diaphragm, which gradually opens a mushroom nozzle as the loss of head increases, allowing a portion of the filtered water to be discharged without passing through the effluent aerator nozzles. In this way the rate is kept nearly constant until the bed refuses to pass the required amount. The difference in elevation between the flow line of the filters and the effluent aerator nozzles is 10 feet, and the filters can be operated at the established rate until the loss of head reaches 7½ feet. The initial loss of head on beds making the longest runs is between 1.4 and 1.8 feet.

A filter temperature minimum of 34 degrees was reached in early January, rising to a maximum of 69 degrees in late July.

The color of the raw water has varied from 20 to 40, with an average (10 months) of 30, while the color of the final effluent has averaged 5, with a maximum of 10.

Aeration

Carbonic acid in filter effluent has varied from 3.5 to 9.9 parts, the maximum being the December average, when the alum treatment was one grain per gallon, with one coagulating basin in service. When the second basin was put into commission, the CO_2 dropped to 7 parts, with a constant decrease to 2.5 parts in August. The corresponding figures for $_pH$ were 5.9 in December, increasing to 6.5 in August. Removal of CO_2 by effluent aeration has varied with air and water temperatures, and with the CO_2 content of the filter effluent. In February an effluent containing 6.7 parts of CO_2 lost 2.1 parts by aeration, in April 3.7 parts was reduced only 0.6 part, while in July 3 parts were reduced to 2 parts. Monthly averages of $_pH$ have shown a fairly uniform increase of 0.2 due to aeration.

An attempt was made to increase the efficiency of the effluent aerator by plugging one-half of the nozzles. The water passing through the remaining nozzles showed a CO_2 content of 4 parts, compared with 4.5 to 5.0 for other aerators using the full set of nozzles, but an increased amount of water forced through the mushroom nozzles to maintain the proper rate of filtration, and the much lower removal of CO_2 in the flow through the mushrooms counterbalanced the increase in the aerator nozzles.

Chlorination of New Line

Before the new plant was connected with the city mains, the aqueduct and the steel pipe line were completely filled with water which had been given a chlorine treatment of 3 parts per million. This water was allowed to remain for several days, and was then wasted through blow-offs on the line, until tests showed a sufficient reduction in excess chlorine. Chlorination of the filtered water was carried on until December 5, and then was discontinued until the middle of July. Since that time chlorine has been applied in amounts varying from 0.15 parts to 0.25 parts per million, the amount being so regulated as to maintain a residual chlorine of one-tenth part per million.

Bacterial Results

Bacterial content of the raw water has been very low throughout the year. Since January 1, the average 37-degree count has been 21, with a maximum of 200, and the average 20-

degree count has been 100, with a maximum of 300. Considerable increase, particularly in the 20-degree count, has taken place in the coagulating basins during the warm weather, the July averages being as follows: raw water 36 at 37 degrees, 150 at 20 degrees; settled water 740 at 37 degrees, 2,450 at 20 degrees. Samples from various points in the coagulating basins showed that the maximum was reached after about two days' detention, with a decrease before passing onto the filters.

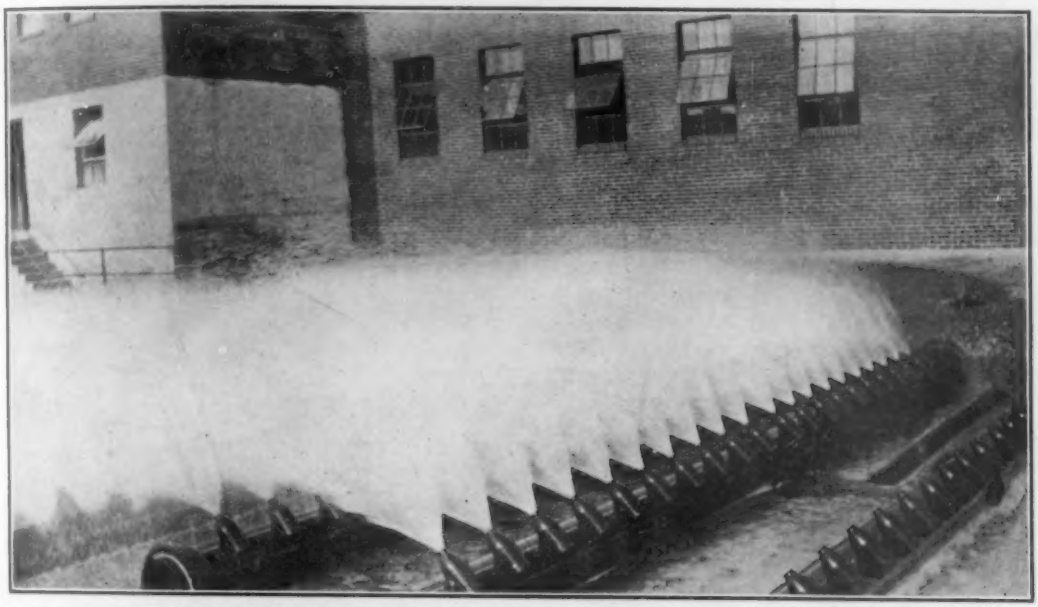
B. coli are practically absent from the water. Since January 1, only four raw water samples and one city tap sample have shown positive presumptive tests in 10 cc. out of a total of 200 samples from each source. The final effluent from the plant has been uniformly negative throughout the year.

Use of Lime

Hydrated lime has been used continuously to supplement the work of the effluent aerator in the removal of free carbonic acid. The $_pH$ of the aerated effluent has varied between 6.0 in December and 6.7 in July, with corresponding variations of CO_2 between 8.0 parts and 2.5 parts. By adding amounts of hydrated lime varying from 10 to 40 pounds per million gallons, the $_pH$ of the final effluent has been held very uniformly at 7.4, with a CO_2 content of 1.5 parts per million. Examination of water from lead service pipes has been continued through the year, and no samples examined have shown lead in excess of .05 part per million.

Power Economies

During the first four months of operation, the north coagulating basin was used alone. The detention period in this basin, which has a capacity of 31 million gallons, was found to be too short for completion of the reaction. The 94-million-gallon south basin was completed and put into commission on February 3, 1927. The storage capacity of the two basins between elevations 254 and 255.50 is 17 million gallons, and because of this fact it has been possible to concentrate the influent aeration and alum treatment into the eight hours between 8 A. M. and 4 P. M. The basins are filled to their maximum capacity at 4 o'clock, and the draft on the filters during the night is cared for by the 17 million gallons above the 254 elevation. Also, all filter washing is done during this same eight-hour period from 8 A. M. to 4 P. M. In this manner almost all of the electric power required is generated by the power-station at the gate-house, which operates only during the hours in which mill-water is being discharged, between 5:30 A. M. and 3:30 P. M. Another economy made possible by this arrangement of treatment and filter washing is the reduction of the operating force to one man between the hours of 4 P. M. and 8 A. M. This effects a material saving in labor costs.



EFFLUENT AERATORS, SHOWING THREE BATTERIES IN OERATION, ONE INACTIVE, AND IN THE REAR AT THE RIGHT THE AUTOMATIC CONTROL VALVE

Personnel

The force, as constituted at present, consists of a chemist, a master mechanic, three men on the day shift, from 8 A. M. to 4 P. M., one man from 4 P. M. to 12 P. M., and one man from 12 P. M. to 8 A. M. A relief operator, who works four days per week from 8 A. M. to 4 P. M. and two days from 4 P. M. to 12 P. M., provides one day off in seven for all employees, and also permits alternating the two night men on the second and third shifts. These six men are all rated as utility men, and are used in all parts of the work, including chemical treatment, filter washing, pump operation, storage of chemicals, janitor service, minor repairs and care of grounds.

No Filtered Water Storage

As there is no clear-water storage at the plant, it has been necessary to govern the rate of filter operation by observations of the height of Hope Reservoir, on the east side of the city. These readings are telephoned to the plant every two hours by the operators at Hope pumping-station, and it has been possible by this method to maintain satisfactory pressures throughout the city. It is expected that on the completion of Neutaconkanut Reservoir, which will be connected directly with the aqueduct by a 60-inch pipe line, it will be possible to operate the filters on a more uniform schedule, without being obliged to follow so closely the fluctuations of the draft.

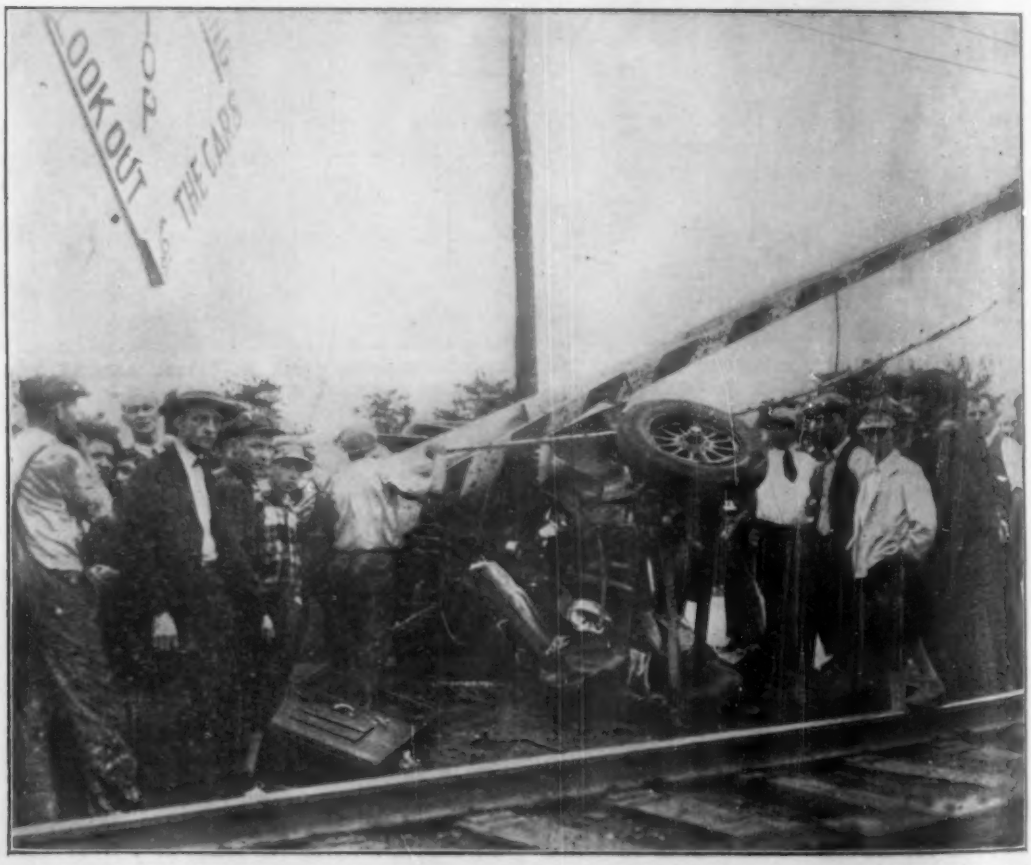
The estimated quantities of materials for the year beginning October 1, 1927, are as follows:

Sulphate of alumina	320 tons
Hydrated lime	100 tons
Chlorine	8,000 lbs.
Coal	400 tons

The estimated expense of operation for the same period is $38,000. This includes labor, chemicals, electric power, fuel, miscellaneous supplies, repairs, and care of grounds.

ACKNOWLEDGMENT.—Prepared from a paper presented before the New England Water Works Association.

Beaten at the Old Game



THIS CAR WAS CAUGHT AT THE OLD GAME OF TRYING TO BEAT THE TRAIN AT THE CROSSING, AT ROCKVILLE CENTER, L. I.

How Intensively Must We Use the Land?

A Study of the Economics of Housing Development and Land Subdivisions—Part II

By John Taylor Boyd, Jr.

SOME of the dangers in presenting estimates of housing costs were referred to in Part I of this paper last month. In housing it is essential to take account of both cost of production and cost of operation and to include full costs. These may be summarized generally into the factors that are given below:

Cost Factors in a Home

Initial or Production Cost—Factors:

1. Cost of land, and lot improvements such as roadway to garage, paths, fences, planting, drainage, etc. Includes proportionate cost of city improvements, such as street frontage, and of public utilities, such as water, gas, electricity, telephone.
2. Cost of design and of building, furniture and furnishings.
3. Cost of financing—mortgage charges, fees and discounts, carrying and financing charges and taxes during construction.
4. Sales expense and profits.
5. Possible future assessments for public improvements.

Operating Cost:

1. Interest on equity, carrying charges, amortization of mortgages.
2. Taxes.
3. Upkeep—depreciation, obsolescence, repairs, insurance.
4. Fuel, charges for water, gas, telephone, electricity, labor, supplies.

Economy of Large-Scale Efficiency in Both Production and Operation

This summary of cost factors requires no further explanation. One sees many a statement of house costs which either leaves a number of these items out or else minimizes them. When the resultant error is equivalent to no more than a couple of dollars a room a month in rentals, the difference eliminates the type of house under consideration from the pocketbooks of millions of people.

Factors of Comparison Between Types of Housing

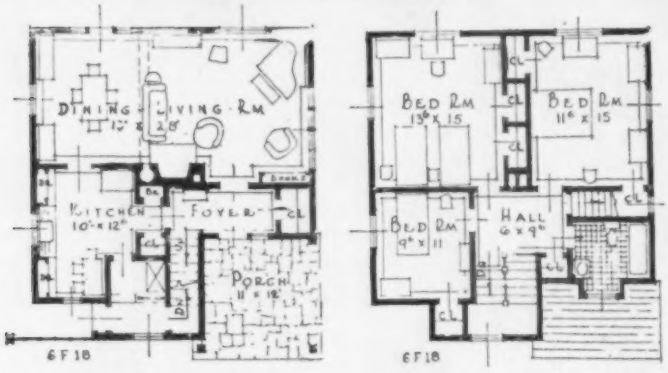
Out of many complex relationships, the following factors are suggested as paramount, giving a fairly clear picture of conditions in a specific case:

1. Standard of adequate unbuilt-on area of site, as determined chiefly by shape of lot and by the *coverage*, or ratio of built-on part of site to total site area
2. Factors of cost per family
3. Factors of cost per room

These factors of comparison require explanation. As concerns the first factor, the adequate standard of unbuilt-on land, a house is apt to be best planned when the shape of its floor plan most nearly resembles a square. The house illustrated on the next page embodies these standards to an unusual degree. It is one of the latest houses designed by the Atlantic Division of the Architect's Small House Service Bureau, number 6-F-18.

It is clear that the typical lot of narrow frontage is the wrong shape for this house, which has an area of 870 square feet, including a porch, and a width along the front of 29 feet 4 inches. Such a house clearly requires a 50-foot street frontage, either as regards the efficiency of the plan of the house itself, or for adequate area and good relation to neighbors' properties. This house is more expensive to build than one containing smaller room sizes, such as is the case of the plan No. 6-F-8, Atlantic Subdivision of the Architect's Small House Service Bureau, which contains a total of 554 square feet, without porch, and 660 square feet with porch. This plan, on the other hand, has almost too small room sizes. The frontage of this house is 25 feet 4 inches, for which a 45-foot front is essential. It must be remembered also that the average home today requires a garage, for which space must be provided on the site. A garage for one car occupies about 300 square feet, of which 180 feet is for the garage building. It should also be stated that these are six-room houses. The experience of the Small House Service Bureau is that the five-room house, which is recommended by Mr. Whitten in the monograph referred to, is not always practical, because when a family assumes the expense and responsibility of establishing itself in a permanent home of its own, it should have room enough for growth. Remember that a workingman's family stakes its all in such an undertaking, "mortgaging" the future for many years in advance. While such a family might rent five rooms in an apartment, it would hardly be justified in taking over a small home unless this home had an additional room. Furthermore, a five-room house also is often less salable when a family must dispose of the house. The area for a five-room house is approximately the same as that of a six-room house, the difference being usually one less bedroom on the second floor. Evidently, also, the cost of the additional bedroom for the six-room house is less in proportion per room.

ONE OF THE DESIGNS (6-F-18) OF THE ARCHITECTS' SMALL HOUSE SERVICE BUREAU



FIRST FLOOR PLAN. SECOND FLOOR PLAN.

PLANS OF DETACHED HOUSE SHOWN ABOVE

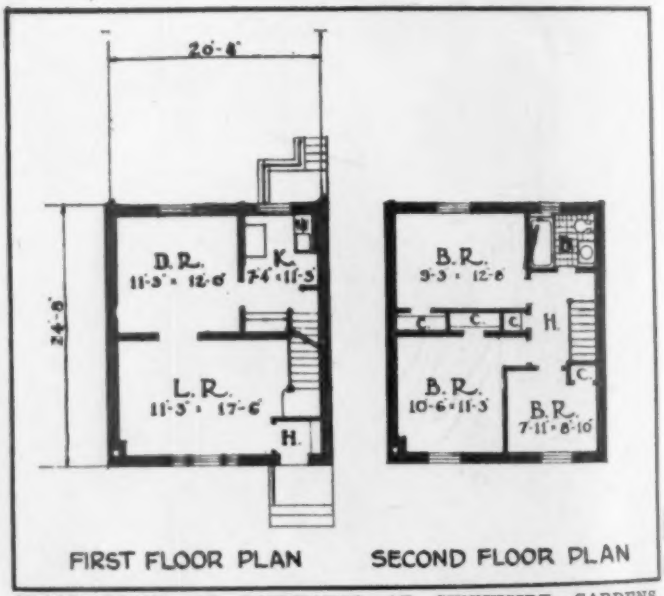
Exceptions to this case will be those communities which are exceptionally favored with low site and building costs, or with mild climate where people can be outdoors most of the year.

As suggested above, the question of cost of the house is fundamental. Unfortunately, there is such variation that one cannot give unit costs which would not be subject to large correction for varying local conditions, room sizes, methods of construction and excellence of architecture. However, the most important point is that, other things being equal, the construction cost per room for the house itself in the individual and row types is not very different from that of the apartment.

The greater efficiency of the apartment plan may be offset by the saving due to the lighter construction of the lower building. It is true that jerry builders seem to achieve lower costs per room for single-family houses than for apartment houses. On the other hand, even the jerry-built houses often sell on the market at a price per room or per family that is not so far below that of the apartment. Here it should be noted that unscientific building laws in many localities frequently penalize the construction of the different dwelling types, serving seriously to disguise their true ratio of comparative cost. This rough analysis of costs of the individual and row house types brings us to the most important point of all. This is, as suggested, that the cost of commercial standard layout of land and public utilities is what makes housing so expensive.

Cost of Land and Utilities

An analysis of different costs in different localities will generally show that the land cost per family and per room is very much lower in the apartment house than in the less intensive



FLOOR PLANS OF ROW-HOUSE AT SUNNYSIDE GARDENS, QUEENSBORO, NEW YORK; SAME TYPE AS SHOWN IN FIG. 3, NEXT PAGE

Built by the City Housing Corporation; Frederick L. Ackerman, Architect

housing types, the difference being approximately equal to the cost of a room or more, even in those cases where land is bought at acreage prices. This, of course, is the reason for the pressure on the commercial builder to narrow his frontage in order to produce his house at low cost. In actual practice, of course, the costs of the less intensive types are masked in the ways described, thus concealing the facts.

In Mr. Whitten's monograph the cost per front foot of a lot width of 37.4 is given as $36.29 per front foot in the average commercial layout. Mr. Whitten, on page 292, says that the 40-foot front lot can hardly be obtained for less than $1,000 to $1,500. Analysis will show, therefore, that a higher cost than this for land makes the individual and row type house impossible not only for the wage-earner, but even for economic classes somewhat above the wage-earners.

For a standard for a row house type, we may take the house of 20-foot 6-inch frontage,

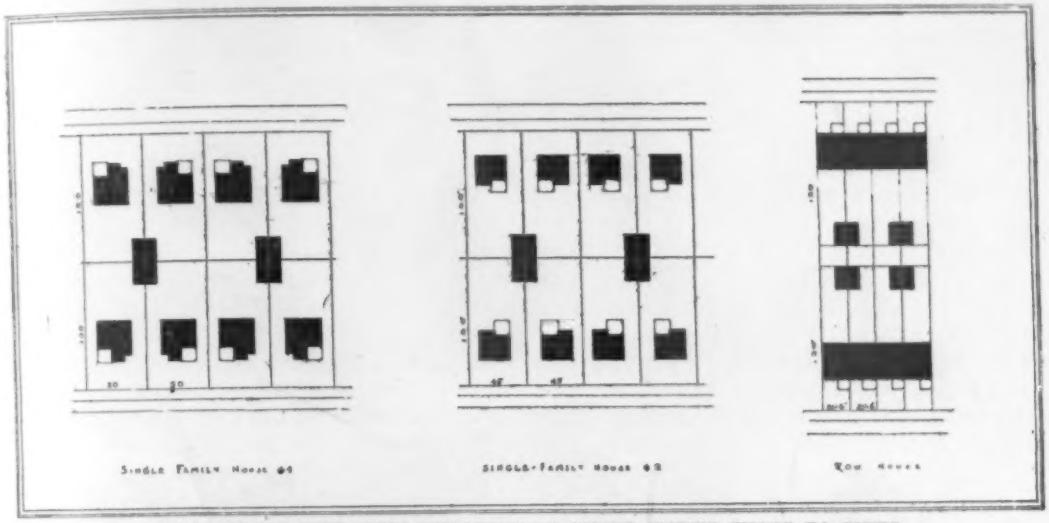


DIAGRAM ILLUSTRATING RELATION OF SMALL HOUSE TYPES TO SITES

The arrangement is based on American real estate standards. These standards are not ideal, either in respect to the shapes of sites and blocks, or in respect to economy of streets and public utilities, which chiefly determine the cost of land. However, they represent familiar usage and probably give the clearest picture of the relation of building areas to un-built-on portions of sites

Reading from left to right, Figs. 1, 2, and 3, details of which are given in the table below

	Individual 6-Room House—Architects' Small House Service Bureau Design No. 6-F-18 in Fig. 1.	Minimum Size Individual 6-Room House—Architects' Small House Service Bureau Design No. 6-F-8 in Fig. 2.	Six-Room Row House Type—City Housing Corp. Type R_8 in Fig. 3.
Area of plot...	5,000 sq. ft.	4,500 sq. ft.	2,580 sq. ft.
Area of house, including porch	870 sq. ft.	660 sq. ft.	610 sq. ft.
Area of garage	180 sq. ft.	180 sq. ft.	180 sq. ft.
Area of buildings	1,050 sq. ft.	840 sq. ft.	790 sq. ft.
Coverage, buildings	21%	18⅔%	30.6%
Number of families per net acre	8.7%	9⅔%	21%
Cost of land per family for increments of 10 cents per sq. ft. for site or $4,356 per net acre	$500	$450	$258
Cost of land per room for increments of 10 cents per sq. ft.	$83.67	$75	$43
Price land per sq. ft. at $1,000 per family...	20 cents	22.2 cents	38.7 cents
Price land per sq. ft. at $100 per room.....	12 cents	13.3 cents	23.2 cents

used by the City Housing Corporation. In order to provide a real garden space and still have room on the site for a garage, it is necessary to increase the depth of the lot to 120 feet. This type has approximately 610 square feet floor area with porch, making 790 feet area of building on a site comprising 2,580 square feet.

The salient characteristics of the three housing types are indicated in the comparative table, which furnishes simple but significant comparisons. Coverage is interesting. They show that, in order to cut the land cost of the individual house almost in half, the coverage in the row type rises to over 30 per cent, bringing it into the garden apartment class. They show also that "congested" conditions are likely to appear when the coverage in the single-family type of house and garage rises above 20 per cent, and when the number of families per net acre rises above 10. Furthermore, those attempts to skimp land that are see neven in some

of the standards of experts are obtained at very slight economic benefit. Of course, as the land cost rises, the situation grows quickly more serious. When a land cost of a dollar a square foot is reached—which, by the way, is nothing at all for a garden apartment building—the land cost of the individual house has equaled or surpassed the construction cost per room, and in the row house the cost of land per room has equaled one-half to two-thirds the construction cost per room. These are the ratios which are so vital in comparisons. A very slight change in the price of land affects the economic possibility of the less intensive housing types seriously. Roughly speaking, when the price of land rises above 25 cents a square foot, the premium to be paid for the individual types sets in, and, on the row types, at 50 cents a square foot. When these figures are reached, it may be well to weigh the possibilities of the garden apartment. All the variations between the individual and row types, namely, two-family attached house, two-family row house, two-family flats, tend to become subterfuges which, from an economic point of view, do not solve the problem. In practice they are emasculated. Raise the price of land to a dollar, a dollar and a half, and the specious value of an emasculated standard disappears.

A Note of Optimism

It is customary to end a story with a "note of optimism" or at least to call attention to the silver lining on the cloud. The point of this study—and many more thorough and scientific studies made by others which I trust will follow mine—is that we should bend our energies to producing the desirable individual house types as efficiently as possible. We should not be balked by customs and preconceived ideas. *We should consider the modern house as an invention,* and perfect it and push it exactly as the automobile or the telephone has been perfected and brought into common use, notwithstanding that these devices went counter to many a time-honored convention. In America we should at least go as far as the English have done, and then farther. Specifically, if we are to preserve the small house for all but a wealthy minority of the population, we should develop efficiency on the following lines:

1. Efficient and architecturally desirable house sites and block shapes
2. Economical layout of subdivisions and streets and public utilities
3. Economical, efficient and attractive house design, following the standards of the Architect's Small House Service Bureau
4. Efficiency of large-scale production of housing
5. Efficient financial methods, placing at the small home owner's disposal capital at reasonable interest rates without the load of fees, discounts, and premiums, of second mortgage charges and other items of highly speculative finance.
6. More scientific laws relating to housing, namely, city planning, zoning, building, fire safety and sanitary codes
7. Exhaustive scientific research into all these phases of housing

Improved standards of housing will allow us to maintain the less intensive house types for these classes of the population which are already able to afford them. Even more, it may bring them within reach of a greater fraction of the population, who cannot now afford them, and for whom the apartment is now more economical in most localities, even smaller cities and towns.

(Part III will appear next month)

Teaching Firemen to Avoid the Perils of Dust Explosions

PRECAUTIONARY measures for fire fighters in meeting dust explosion hazards were discussed at the recent Fire Prevention School held in November under the auspices of the Milwaukee Association of Commerce, by David J. Price, engineer in charge of the Chemical Engineering Division of the Bureau of Chemistry and Soils in the U. S. Department of Agriculture at Washington.

Instead of removing immediately the contents of bins in mills and elevators in which there has been a fire that apparently is extinguished, it is better to wet down the material thoroughly before removing it, thus preventing the ignition of clouds of dust. The firemen themselves should make systematic inspection of plants, so as to recommend safety measures and also to become familiar with the danger spots that exist after fires have started. Unwise methods of fire fighting sometimes cause explosions. For example, it is better to use a spray instead of the full stream of a fire-hose on a pile of explosive dust.

The Bureau of Chemistry and Soils has records of 300 dust explosions. In 77 of these explosions 496 people were killed, and in 105 of them nearly 900 were injured. In 161 cases the property loss averaged nearly $250,000 for each explosion.

Chemists and engineers, including those in the U. S. Department of Agriculture, Washington, D. C., have been studying dust explosions. Firemen should familiarize themselves with these findings, Mr. Price said, so that they can protect themselves. Many of the ordinary dusts of commerce are more or less explosive.

Photograph by Fairchild Aerial Surveys, Inc.

AIRPLANE VIEW OF THE WATERFRONT, CHARLESTON, S. C.

Charleston's Waterfront Driveways

By Roy S. MacElwee

Commissioner of Port Development, Charleston, S. C.

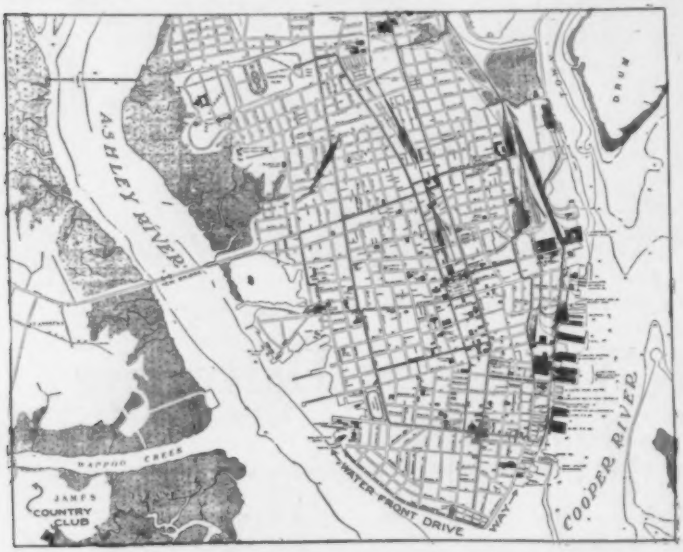
CHARLESTON, S. C., has made an effective start in the rational use of its waterfront for parkways as well as for industrial development and marine terminals. The city is geographically well adapted to full utilization of its shore line. It is strikingly like New York in its contours, only on a smaller scale, built on a long, narrow peninsula, which barely escapes being an island similar to Manhattan. Its two rivers, the Cooper and the Ashley, unite at the Battery to form Charleston Bay, which is separated from the sea by a series of islands—James Island, Sullivan's Island, the Isle of Palms—corresponding to Staten Island, Gravesend, Coney Island, Rockaway, etc.

The settlers, from 1680 on, built their houses along the irregular contours of high land, many separated from the channel by wide tidal marshes, while the shipping naturally gravitated to the deeper water, the Cooper River, where various generations of wharves have been constructed. The residences sought the lower tip of the peninsula, where Colonel William Washington in 1760 built the residence now standing in perfect preservation facing what was called White Point Gardens. Colonel Washington was a cousin of George Washington and the commanding officer in the Continental victory in the battle of Eutaw (1781). Other points of high land (the word "high" being used to mean land permanently above the high-water level) were likewise utilized for residential sites, where deep-porched, high-ceilinged mansions, high above basements, draped with trailing honeysuckle and wisteria, and fanned by balmy sea breezes, looked out under moss-draped oaks.

The waterfront boulevard movement started about 1830, when the present East Battery, or High Battery, with its sea-wall, was constructed from Shamrock Terrace (now the Shrine Club), and the marshes behind it were filled in. The stately, high and fortress-like mansions, with wide columned porches and lovely iron grills across doors, windows and gateways, with one exception became fully developed by 1850 as they now stand. This was the first utilization—for a driveway, for residences, and for a promenade—of this waterfront that other-

wise might have been occupied by wharves. But this could have been made of value to shipping only with great effort to overcome the tendency to shoaling, due to the fact that the rivers meeting at this point slow up and drop their silt.

It was along this very wall on High Battery that the excited population of Charleston gathered, on April 12, 1861, to watch the bombardment of Fort Sumter from Fort Johnson on the tip of James Island, now occupied by the Quarantine Station. It is said that once upon a time a promising young assistant bank cashier was offered a substantial promotion in rank, salary and opportunity in an enterprising new interior city but declined because he preferred to remain in Charleston, where every Sunday he could "worship in St. Michael's Church and then walk on High Battery."



WHERE THE RIVERS MEET AT CHARLESTON

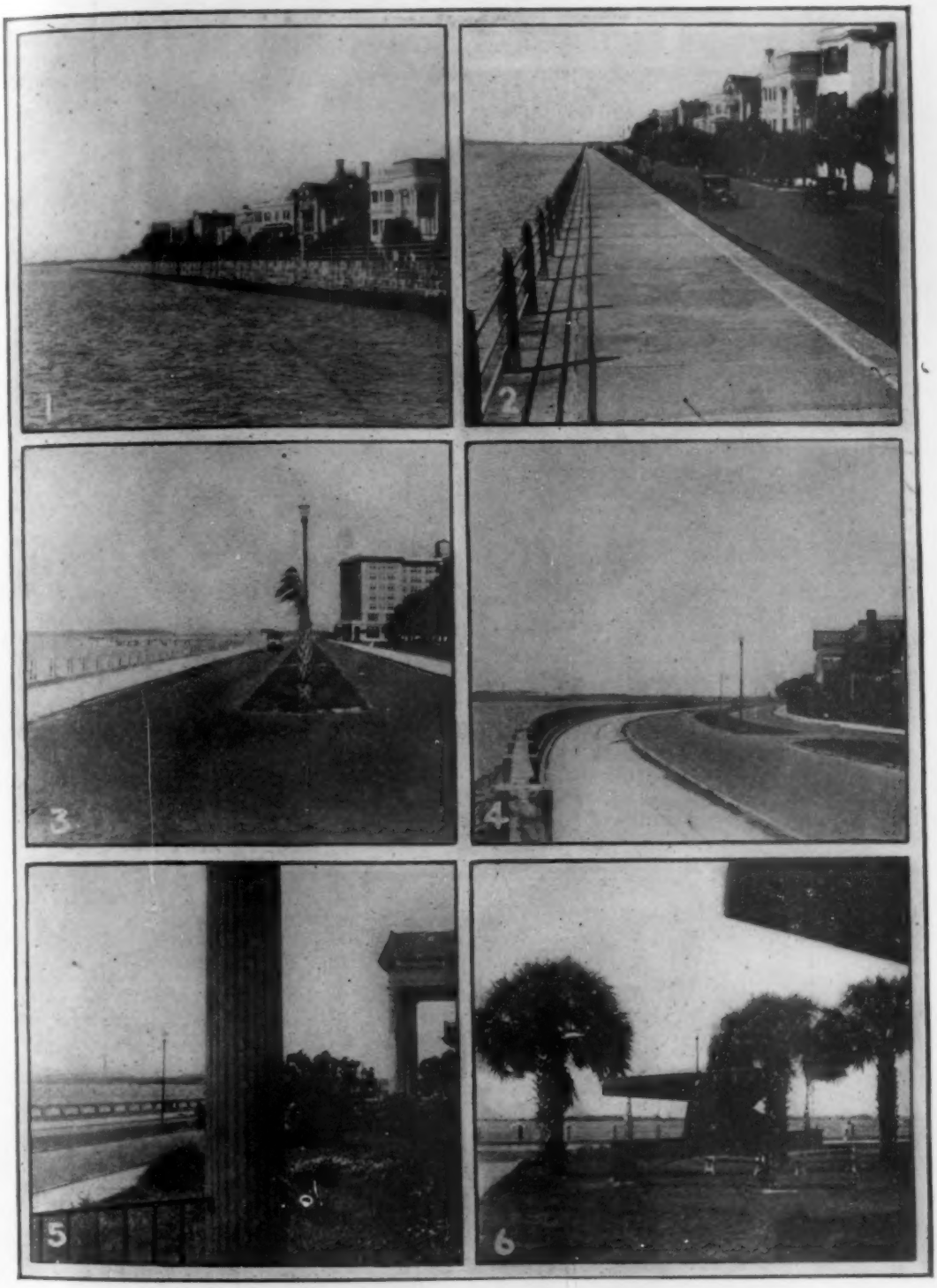
The Ashley River marshes were gradually encroached upon and filled-in here and there as opportunity afforded, but no substantial effort was made to construct a waterfront boulevard along the Ashley River until the term as Mayor of R. Goodwyn Rhett, sometime President of the Chamber of Commerce of the United States. From 1909 to 1911 a sea-wall, promenade and driveway was extended from the Battery at the foot of King Street to Tradd Street, where a continuance of the shore line for civic development is blocked by the U. S. Lighthouse Headquarters for the 6th Naval District. The area added 47 acres of high-class residential property.

The boulevard has added a full mile to the old East or High Battery. A. B. Murray, a public-spirited citizen of Charleston, personally paid for the missing link in the driveway along the park, "White Point Gardens," thus making it possible for automobiles to circulate down East Bay and East Battery along the Cooper River, and turn northwest on Murray Boulevard along the Ashley River to Tradd Street.

The people of Charleston feel that this is only the beginning of their waterfront development. There are marshes and flats between natural high land and the Ashley River above the Lighthouse Station, on up above the new $1,500,000 Ashley River Memorial Bridge. The titles to a large portion of these flats have already been acquired by the city, and other portions are owned by citizens who will join with the city as soon as city finances and the demand for waterfront residence property will permit the continuation of the boulevard the full length of the frontage on the Ashley River.

Although Charleston has not yet passed a zoning ordinance and adopted a city plan, by accident or merely because of the geographic, hydrographic or meteorologic situation there has developed a natural city plan. This is not sufficient to preserve the historic and architecturally unique colonial city; yet the city has escaped the complete blight that has fallen upon some other cities. It will not be necessary in its future zoning to make huge expenditures as several cities have done because of early mistakes that required remedial action later.

The south and west part of the peninsula grew as a residential section because of the prevailing sea breezes and the views across bay and ocean. The Ashley River above the city limits has long been the site for fertilizer and chemical plants. Twenty-one feet of water at low tide and 26 feet at high tide are sufficient for schooners and small chartered vessels in this trade. The Cooper River waterfront, with 30 feet of water at low tide and 35 at high tide, has come to be the location for the private, railroad, and city wharves, the great oil refineries and tank yards, the U. S. Navy Yard, and the U. S. Army Supply Base, now operated under lease by the city. All such activities demand deep-water frontage capable of admitting the largest commercial vessels. The territory in the neck of the upper end of the peninsula has gradually taken on the nature of an industrial terrain of the port. However, beyond



VIEWS OF VARIOUS SECTIONS OF CHARLESTON'S WATERFRONT

1.—East Battery from the Bay. 2.—High Battery, looking down East Battery. 3.—The Ashley River branch of Charleston harbor, and Murray Boulevard past White Point Gardens. 4.—The Boulevard, one mile of drive and 48 acres of new lots reclaimed from the marshes. 5.—Boulevard lots are exceptionally attractive home sites, with a sunset view across the broad Ashley and the prevailing trade winds blowing out of the southwest. 6.—The Battery, White Point Gardens, where the waterfront drive turns west and north again

the ten-mile post of the concrete highway, there are several very fine club developments and estates, notably Yeaman's Hall, a proprietors' club.

Because of the natural conditions that have brought about the rational use of the waterfront for residences and recreation on the one hand, and shipping and industries on the other, the High Battery driveway, overlooking the bay where ships pass in and out and the sun rises in tropical splendor, and the breeze-swept Ashley with its distant salt marshes and low-lying islands, and its brilliant sunsets, due to peculiar vaporous conditions of the low country, constitute a waterfront boulevard system that fills the visitor with enthusiasm and the hearts of the dwellers in Charleston with contentment.

Another Kind of Waterfront

Are the river banks of your city decorated in this manner with dead dogs, wrecked automobiles and discarded home and industrial equipment? If, instead of using your river as an open sewer and its banks as garbage and refuse dumps, it has been beautified and made a place for clean and healthful recreation, THE AMERICAN CITY *will be glad to receive photographs for reproduction as an inspiration to other communities.*

First Mothers' Safety Council Formed in Philadelphia

How Lives of School Children Are Being Safeguarded by Extraordinary Measures Taken Through Various Sources

By K. H. Lansing

TWO hundred mothers of children killed in traffic accidents in Philadelphia during the last four years, met on October 6 and formed the first Mothers' Safety Council in the United States. The plan of this remarkable gathering of women into whose lives poignant tragedy had entered in common, was to cooperate with the Citizens Safety Committee of the Philadelphia Chamber of Commerce, of which it now forms a part, in appealing to other mothers to teach their children to avoid highway hazards and to exercise caution in the streets and thus reduce the number of casualties among the young while crossing at street intersections, "catching rides" or playing on the thoroughfares.

The urgent need for some such decisive procedure is recognized when it is known that in the last 4½ years 554 children have been killed in street accidents in Philadelphia, while 17,753 have been injured. Yearly, some 4,000 traffic accidents wherein persons are injured and about 125 in which death results, happen in this city. Nearly half a million motor cars are in use in Philadelphia and, in 1926, trucks alone injured 2,579 persons and killed 121. Children stealing rides on passing vehicles, inviting accident, in the past year have brought this class of cases to an increase of 177 per cent for the period.

Prior to the meeting of the mothers, the Philadelphia Chamber of Commerce, through its Citizens Safety Committee, determined to launch the most comprehensive campaign for child safety ever attempted and, with this end in view, invited the close cooperation of the Child Safety Committee, a group of prominent women headed by Mrs. George H. Strawbridge, who is also a member of the Board of Governors of the Citizens Safety Committee.

Campaign of Mothers' Safety Council in Philadelphia Effective at Start

Highway fatalities in Philadelphia in October, 1927, following the inception of the safety campaign, were fewer than in the corresponding month of 1926, despite increased traffic due to mild, favorable motoring weather. The Citizens Safety Committee of the Philadelphia Chamber of Commerce, announced on November 1, that 47 persons were killed in October, 1926, in highway accidents, whereas only 35 met death in similar manner during October, 1927.

At the mothers' meeting, which assumed the form of a noonday luncheon at one of the leading hotels, as a preliminary to the active opening of the campaign, Fred W. Johnson, Managing Director of the Citizens Safety Committee; W. R. Kelly, its Secretary; Benjamin B. Ludlow, former state representative; Inspector John Stuckert, representing Director George W. Elliott, of the Department of Public Safety; Colonel George Kemp, Postmaster of Philadelphia, and E. W. Miller, Vice-President of the Indemnity Insurance Co. of North America, all authorities on the subject, addressed the gathering on the topic of safety on the highways. As presented at this session, the plan embraced the following steps:

Reaching, during the period of the campaign, to last two months, every father and mother in the city, through the women's committee, with a message explaining what will be expected of them.

Giving every child in the public and parochial schools extensive instruction in highway safety measures through the cooperation of the Board of Public Education and the officials of the parochial schools.

Dividing the entire city into four districts, or zones of instruction, the work to be carried on in each of these districts for a full week.

Distribution, by teachers, of safety literature among all pupils in each district at the outset of each week, together with blank forms to be taken by the pupils into their homes for the mothers to fill in at least one suggestion, apiece, for the prevention of accidental injury to children on the streets, the blanks then to be returned to the teachers by the pupils and turned over to the Citizens Safety Committee for tabulation and future use.

Enlisting the aid of the police department and

the large radio broadcasting stations.

Posting, in every public and parochial school in the city, for the final month of the campaign, a juvenile traffic record for the month, the teacher daily to give a brief talk on any recorded accidents of the previous day, and explain ways in which these might have been avoided.

No sooner had the campaign been launched than the public and parochial school authorities entered whole-heartedly into the plan. Dr. E. C. Broome, Superintendent of Public Schools, and the Rev. Dr. John Bonner, head of the parochial schools, both of whom are members of the Board of Governors of the Citizens Safety Committee, at once offered every facility and service to the committee and it was announced that Director Elliott would permit uniformed policemen and firemen to speak, from time to time, as urged by the committee, in the schools, emphasizing the proper use of the streets and the hazards of fire and fire apparatus. This work is already in progress. The pupils of the various schools are now taking home the blanks from the Citizens Safety Committee furnished to the teachers and some very practical suggestions have been made thereon by mothers and returned to the committee.

While the active campaign for the present is being concentrated into two months, the work has only just begun and emphasis of the various phases of safety to children will be continued through the winter and spring and in the early summer a new concentrated safety campaign will be started. During the winter months, there will be safety features relating to coasting, skating and snowballing in the streets and highways and, as the year rolls around, there will be seasonable safety phases emphasized for the different months.

Voting Machines Successful in Greater New York

NEARLY 2,000 voting machines were used successfully at the election held November 8 in New York. The boroughs of Manhattan and Brooklyn were completely equipped with the mechanical ballot.

At the presidential election next year all five boroughs comprising Greater New York will use machines. This will complete the installation program initiated in 1925, when 75 machines were employed in the Fifteenth Assembly District in Manhattan. Last year upwards of 600 machines served several assembly districts.

It was clearly demonstrated at the election this year that voting machines are the means of reducing election expenses to a very appreciable extent. While definite figures are not available at this time, the items of saving can be pointed out. First, the services of two clerks in every one of the 1,864 election districts were dispensed with. Second, the compensation of the four inspectors in each election district was reduced from $16 to $11. Third, upwards of 200 election districts were consolidated, thereby wiping out all of the election expense. Fourth, the paper ballot expense was done away with.

MAYOR WALKER AND MRS. WALKER AT A VOTING MACHINE ON ELECTION DAY IN NEW YORK

The New York ballot was rather complicated this year on account of the submission of nine amendments and one local proposition. Because of this fact, balloting was somewhat slower than it was last year. However, the great majority of voters cast their votes on machines in less than a minute. Others, who did not take advantage of the instruction given on the small model and diagram in each polling place, required several minutes.

At the close of the polls the total results on each machine were quickly transcribed to the return sheets, and in an hour the central compilation board at Police Headquarters were swamped with returns.

GEORGE W. CONKLIN,
Deputy Chief Clerk, Board of Elections, in charge of voting-machine activities.

Four Hazards to Success and Progress in City Manager Government

By Leonard D. White, Ph. D.

Professor of Political Science, University of Chicago

THE council-manager plan has passed beyond the experimental stages, but it has not reached and probably never will reach the point when problems of great importance and difficulty will not confront it. Some of these problems will be presented by the environment in which manager government finds itself, the character of the town and of its principal figures, the quality of its newspapers, chamber of commerce or labor unions; others will be set by the character and quality of the councils; still others by the ability and purposes of the managers themselves. As a student surveys the scene at the end of nearly two decades' experience with the manager plan, he may readily discover present problems of the greatest significance, some of them fraught with the most serious consequences to the manager movement. Of these, four will be referred to in the following paragraphs.

Observations and Conclusions from a Study of City Manager Government

The accompanying article forms the concluding portion of Chapter XIV of Dr. White's recent book, "The City Manager," copyright 1927 by The University of Chicago Press, and here reprinted by special permission of author and publisher. This outline of hazards to success and progress in city manager government should be read in connection with the installment published in this magazine last month—or preferably in connection with the entire book, of which these two installments comprise the final chapter.

Weakness of City Councils

The failure of the city council is one of the most startling weaknesses of the council-manager plan. Making exception of the first council elected under the manager plan and of a few residential cities like East Cleveland or Winnetka, the failure of the council to measure up to its responsibilities is widespread. The first council elected under the new régime is likely to be satisfactory; but before many years have passed, an insidious process of decline sets in. The old crowd regains its courage and persistently prepares the way to elect one of its representatives to the council, then two, finally a majority. The "business men" meanwhile find that their personal affairs cannot be neglected too long; they insist on being replaced by others; and they seldom display the tenacity or the ingenuity of the professionals who make politics their business.

Manager Carr complained once that the greatest weakness of the manager plan was that there was no organized body back of it. There is usually organized opposition to it, and this opposition rightly understands that control of the council will give absolute control of the city government. In some cities the reaction against "politician government" has been so thorough that it seems unlikely that it can be restored; but, viewing the country at large, it is clearly an unsettled question whether the desire for non-partisan, scientific city government has a commanding position in the minds and hearts of the American voter. In the smaller cities the answer seems fairly clear; but in the larger cities many an engagement will be fought before the ultimate triumph of modern ideals of government is assured.

Apart from the political phase of this situation is another of perhaps equal importance. The decline of the council is not only usually a reversion to politics, it involves also a loss in ability and foresight and capacity for leadership. No organization, however perfect, will function to give good government unless it is manned by men who can breathe into it the good-will and vision of good government. A council composed of men without a broad vision of the opportunities and needs of city government, lacking the courage to take the initiative, devoid of the will to discharge their duties intelligently, and unable to assume the leadership of their community, can nullify the efforts of the best manager in the country—or drive him to assume their responsibilities. It is unfortunately true that the majorities in many city councils in council-manager cities are composed of such men. There is a continuing danger that the preoccupation of business men with

their affairs and the unwillingness of civic leaders to accept the often unpleasant duties of a campaign will hold the level of council ability at far too low a level. The council-manager plan will not show clear-cut superiority as long as it is forced to labor under this handicap; and, vice versa, the mayor-council plan will not demonstrate its potential promise until the voters select a different type of representative in the councils.

All this means perhaps no more than to say that the performance of the manager is fundamentally conditioned by the kind of council with which he has to work; but it should be understood that the first years of the council-manager plan are likely to be the best unless constant effort is made to hold up the level of ability in the council. It is hardly too much to say that the council is the real problem in the manager city.

Can Administration Be Separated from Politics?

A second hazard facing the manager movement is to be found in the adventuresome spirit of many managers, especially those new to the game. These aggressive personalities seek not only to give good administration, but also to furnish the brains, enthusiasm, and leadership in deciding what shall be the policy or program of the city. This may be referred to as community or civic leadership and has been described at length in preceding chapters [of the book from which this chapter is quoted]. The temptation to follow this path is intensified by the unwillingness or inability of the council to supply effective leadership. This course is one which, if persisted in, will sound the death-knell of the manager plan as now conceived, for a manager who undertakes civic leadership stakes his position on the acceptance of his program by the voters. If his program is rejected—and no man can supply effective leadership without openly courting the possibility of rejection—he sacrifices his position as manager. Moreover, by entering the arena of public opinion and identifying himself with a policy or program, he allies himself with one group of citizens and against another and incurs ill-will which is bound to be transferred to the purely administrative phases of his work.

It ought to be possible in this country to separate politics from administration. Sound administration can develop and continue only if this separation can be achieved. For a century they have been confused, with evil results beyond measure. The managers have an unparalled opportunity and a deep obligation to teach the American people by their precept and conduct that their job is to administer the affairs of the city with integrity and efficiency and loyalty to the council, without participating in or allowing their work to be affected by contending programs or partisans. Their duties with regard to the policy of the city are properly restricted to recommendations to the council and to supplying information to citizens upon request. They have a duty on their own initiative to keep the city informed on the administrative program and achievements, but can hardly go beyond this to dabble in the public advocacy of an unsettled policy. Mr. I. G. Gibbon, an English authority on local government, was well within the truth when he wrote:

> "The manager often becomes not only the initiator but also the public advocate of policy. . . . This indicates the chief danger of the whole system. The manager, if he dabbles in policy, if he becomes to the electorate a prominent, perhaps the most prominent, representative of particular measures, marches beyond his intended beat, and he, and the system of which he is a pattern, may suffer disaster with the particular policy which is advocated."

The Dangerous Inclination of Cities to Prefer Local Men

A third hazard which faces the manager is the inclination of American cities to prefer local men. This is a matter of fundamental importance, the significance of which has been obscured by reason of the rapid expansion of the movement and the monetary creation of a large number of new positions. This frontier is doomed, and probably in the not far-distant future. As the number of manager towns becomes stable, the number of initial appointments will dwindle and eventually disappear. Examination of the figures presented in an earlier chapter demonstrates that as the order of appointments moves from first to second and third and fourth, the proportion of outside appointments declines. But in ten years most of the manager towns will be in their fourth or fifth or sixth appointment. The evidence now available indicates a most unfortunate progressive restriction of the opportunity for a manager to be promoted from city to city.

If this restriction coincides with a persistent attempt of the manager to concern himself with policy, the outcome is almost inevitable. A local manager, who is also a community leader, is the counterpart of the strong mayor; and it would not be long before the people would insist on electing the official who takes the lead in advocating policy. This would mean a reversion to the strong mayor plan of city government.

The managers are hardly in a position to influence the conduct of their colleagues with reference to participating in the initiation and

advocacy of policy; they are not at all in a position to influence the preference of citizens for a local man over an "outsider." Here they are in the grip of forces more powerful than they, the outcome of which is still problematical. The substantial elimination of the chance to move from city to city would be disastrous to the hope of building up a group of professional administrators and probably would spell the end of the manager movement.

On the whole, however, one need not become pessimistic with respect to this phase of the situation. The general tendency of the time is in the direction of more and more freedom to circulate. Public health experts, highway experts, educational experts, traffic experts, move easily from city to city; and it is more than likely that administrative experts will acquire the same freedom if they remain administrative experts.

How Enlist and Train Young Men for the City Manager Profession?

This observation may serve to introduce the fourth hazard to which it seems important to refer. This is the risk that there will not be a steady flow of capable and well-trained young men entering the profession. Dr. A. R. Hatton frankly said a few years ago that he could not assure the cities' considering the plan of a supply of trained and experienced executives. The amazing combination of experience and training, or absence of training, which has flowed into and out of the manager's office certainly gives justification for Dr. Hatton's caution. The managers have been persistently indifferent to this problem, revealing thus a preoccupation with their own job and an unwillingness to think in the larger terms of their profession. Few managers have understudies; few managers open an opportunity for assistant managers.

This, of course, is not a problem which the managers alone can solve. They can do much more than they are now doing. The universities must coooperate more effectively than has yet been the case, and should at once reconsider the need for the public service, together with the type of training which is required. The fundamental issue is whether the American cities are going to require professional, trained administrators in the future or whether they will rely upon their political leaders to conduct administration. The answer to this question will be greatly affected by the presence or absence of a body of men technically qualified to do municipal administration. If the men are not available, the cities certainly cannot use them.

It seems imperative, if the manager movement is to prosper, to work out a recognized type of preparation for it. Indeed, the failure to offer to young men an acceptable preparation is to lay a heavy handicap in the whole manager plan. This is a situation in which the managers might well take the initiative, with the assurance that they would meet with a cordial response from the universities and schools of technology.

A Noteworthy Record of Achievements

These are among the hazards which seem to be implicit in the future. Looking back over the past, the manager movement shows a noteworthy record of achievements. These are most evident in the economy and care with which the business affairs of the city have been handled. There has been consistent effort to use the city money with the same intelligence and foresight which would be expected in a private corporation. Appointments have been on the basis of merit, deadwood has been eliminated, careful supervision has been imposed, excellent accounting and financial methods have been installed, purchasing has been carefully handled, and the planning of work and expenditures has been thoughtfully executed. There has been an absence of the fluctuations which are common in mayor-council cities subsequent upon elections. The managers have not been inventors, but they have adopted and used sound methods of administration. Their administrative record is on the whole admirable.

The managers have demonstrated a unique readiness to accept responsibility. They accept the theory of the charter that they are in charge of administration and are ready to take whatever criticism is due their mistakes. They do not "pass the buck," but are forthright and straightforward. They defend their subordinates from unwarranted criticism and sometimes even draw the fire of those at odds with the council. They are the target of an endless amount of criticism, trivial and serious, which they have learned to discount and to accept.

The managers have frequently but not always developed admirable qualities of administrative leadership. By this is meant the capacity to attract the loyalty and enthusiasm of their subordinates and to stimulate in them an esprit de corps which largely eliminates the problem of supervision and dicipline. By this is meant also a willingness to devolve responsibility on others and yet to cooperate with all in such a way that all feel the support of the manager's advice and presence without becoming aware of a trace of interference.

Finally, the managers have made a remarkable record of devotion to the larger interests of the city, even at considerable cost to themselves. They have sincerely tried to see the city as a whole and to eliminate any suspicion of favored treatment for any part. They have conceived the city not merely as an organism of the present but as a creation of the future. In planning streets and sewers and water-mains, they have refused to make a record of present economy by installing equipment inadequate for probable future needs. They have been wholly unwilling to deceive the voters about the real condition of public affairs and have frankly given the facts to the public. They have dealt openly even with their critics. They have sought support for the larger interests of the city on the basis of the plain truth, and have been content to let their record speak for itself without unnecessary advertising on their own part. They have been refreshingly free from the arts and wiles of the traditional American executive, and by their unflinching devotion to their job have furnished the American cities with a new and finer conception of official duty.

Municipal Yuletide Activities in Denver

By Ivan E. Houk

THE city officials in Denver, Colo., believe in municipal Yuletide activities. Denver has had a municipal Christmas tree, a municipal Christmas program, Yuletide decorations on the streets and in public places, and caroling, for so many years that the custom of carrying out such municipal celebrations during the holiday season has become firmly established. Nowadays, when the holiday season approaches, the residents look forward to, and expect, such activities; and since the city officials have been trying to develop some new idea each year, the people look forward with more than usual interest, wondering what new decorations, what novel program, or what previously unthought-of feature is about to be displayed.

Many Decorated Christmas Trees

During recent years the municipal activities have consisted principally of installing elaborate decorations at the Civic Center. The accompanying photographs illustrate more or less typical installations. Each year one, two, or sometimes three, large evergreen trees are brought from the nearby mountains, set up in

VOORHEES MEMORIAL, DENVER, AT NIGHT, DURING HOLIDAY SEASON OF 1925-26, SHOWING SANTA CLAUS AND HIS REINDEER ILLUMINATED BY FLOODLIGHTS

See cover illustration for details of this view

Photograph from Denver Tourist Bureau. See also front cover of this issue.

DENVER'S MUNICIPAL CHRISTMAS TREE, IN THE CIVIC CENTER, IN THE SHADOW OF THE COLORADO STATE CAPITOL

prominent places at the Civic Center, strung with electric wires, and decorated with red, green, and blue electric lights. Small trees are also brought from the mountains, set up in the Civic Center park, and similarly illuminated. Sometimes the small trees are scattered throughout the park; sometimes they are arranged in groups, forming veritable forests of Christmas trees. Usually a large white light of about 100-watt size is placed at the top of each large tree. Sometimes the lamps in vertical segments on the larger trees are connected in two or three separate circuits and arranged so that they are automatically turned on and off in rotation, thus causing the lighting effects to travel around the tree.

In addition to the installation of Christmas trees, stringers covered with evergreen, carrying different-colored electric lamps alternated with red paper bells, are run from the larger trees to other parts of the Civic Center. Lamp-posts are covered with evergreen. Clear lamps in the regular park standards are replaced by red and green bulbs, or by plain-glass bulbs dipped in red or green paint, so that the park illumination will fit in with the general decorative scheme. Large wreaths of evergreen and lengthy festoons are placed on the various monumental structures, such as the City Library, the Voorhees Memorial, which forms the north entrance to the Civic Center, and the Open Air Theatre, sometimes called the Greek Theatre, at the south side of the park.

During the holiday season of 1922 and 1923 two large trees, one 74 feet and the other 78 feet high, more than 400 small trees, 220 large wreaths, 150 large Christmas bells, and 20,000 feet of festooning were used in the decorations. That year a municipal program was held at the Civic Center on Christmas night, and more than 4,000 sacks of candy were distributed to the children by the Mayor. Sometimes municipal programs consisting of singing by the crowd, and by trained singers, orchestral music, and Christmas pageants, arranged in cooperation with various civic organizations, have been held at the Civic Center both on Christmas Eve and on Christmas afternoon.

In the decorations of December, 1923, and January, 1924, one 60-foot tree and two 40-foot trees were installed, as shown in one of the accompanying night photographs. In addition, 250 small trees, 3,600 colored electric lamps, and various other decorations were used. For the holiday season of 1924 and 1925 a 90-foot tree was set up in the center of the park, and smaller trees grouped nearby. Approximately 3,000 varicolored lamps were used in the entire display, of which about 500 were placed on the large central tree. Similar installations were made in December, 1926, and are now being planned for December, 1927.

Novel Features

Additional interesting and novel decorative features of various types are sometimes utilized in the installations. During two or three

seasons following the close of the World War, flags of all nations were flown in prominent places. During the last two seasons live deer have been brought from the City Park Zoo and housed in temporary quarters just inside the Voorhees Memorial. This feature has proved especially attractive to all—to the grown people as well as to the children. For several years a large globe of the world, approximately six feet in diameter, with the town of Bethlehem clearly indicated, has been suspended in the air, where it can be easily seen. Each season since Christmas, 1922, a model of the standardized Santa Claus, with his sleigh drawn by four reindeer, really Colorado elk, has been placed on top of the central arch of the Voorhees Memorial, and a typical red brick chimney set alongside, the whole being illuminated at night by flood-lamps. An ingenious electrical control keeps the sleigh-bells jingling continuously, through the day as well as at night. Small evergreen trees are placed on top of the other parts of the Voorhees Memorial, and also on top of the Open Air Theatre; and wreaths, festoons, and garlands galore are placed on the sides.

The usual Christmas and New Year's greetings, as well as other Yuletide messages of good-will and good-fellowship, are displayed in prominent places each season. As soon as Christmas has passed, the sign "Merry Christmas," usually placed on the Voorhees Memorial just under the reindeer, is replaced by one reading "Happy New Year."

Variations from Year to Year

Plans for the installations are made by the city officials under the general supervision of Charles D. Vail, Manager of Improvements and Parks. The problem of varying the layout from year to year becomes somewhat difficult as time progresses, inasmuch as the Christmas trees themselves and the general style of the illuminations are more or less standard and can hardly be changed. Variations must be produced by using different numbers of large trees, placing them in different places, varying the arrangement of the small trees, changing the locations of the stringers, using different decorations on the Voorhees Memorial and the Open Air Theatre, and trying to develop some entirely new feature of universal attraction. From the standpoint of variation, the installation of cut trees each year possesses definite advantages over the installation of growing trees, since it would not be desirable to fill the Civic Center permanently with live trees.

The decorations are usually installed about a week before Christmas, and are taken down about the end of January. However, the lights are not burned every night during this period. They are generally burned during the week from Christmas to New Year's, and again during the week about the middle of January when the Stock Show is in progress. Sometimes the work of installation and dismantling is done by employees of the City Park Department; at other times, by outside corporations such as the Public Service Co. of Colorado, under contract with the city. Ordinarily, the total cost does not exceed about $2,000, less than a cent apiece for the residents of Denver. Of this amount, about a thousand dollars represents the cost of labor and materials; and the other thousand, the cost of the consumption of current.

Firemen as Public Speakers on Fire Prevention

SOMETHING unique in municipal work, which, if successful, will have a far-reaching effect, is that of training firemen to become public speakers so that they can make speeches on fire prevention to the children attending public and parochial schools.

This plan is being worked out in Milwaukee in connection with the Fire Prevention Section of the Safety Division of the Milwaukee Association of Commerce, with the cooperation of the Milwaukee Fire Department. The members of the Fire Prevention Section, many of them prominent Milwaukee business men, have realized the value of more intensive fire prevention, and through the new plan they hope to reduce the number of fires in this city.

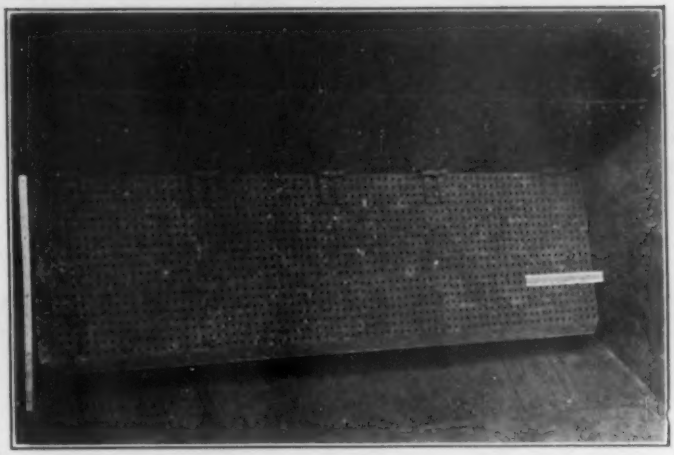
In cooperation with Fire Chief Peter Steinkiller and E. Hackett, District Fire Chief, the Fire Prevention Division is conducting an investigation among all the city firemen and will select fifteen whom they believe capable of speaking well before an audience. These fifteen men will be given good training through the Junior Association of Commerce, which has a large public speaking class. When they have completed the course, they will be sent to the various schools of the city. Each school will be addressed once a month by a fireman. It is believed that to have a fireman address the children will have an excellent effect and will impress them with the importance of fire prevention.

The Semi-Annual Index of THE AMERICAN CITY (Volume XXXVII, July-December, 1927) will be found at the end of this issue.

Indianapolis Reaps Profit in Garbage

By Eugene M. Reid

MAKING money out of garbage is not new in Indianapolis, Ind., but with the opening on June 1 of a $460,000 reduction plant, equipped with the most modern machinery designed to extract every salable product from otherwise worthless refuse, vastly increased profits are anticipated. Already sales of grease have amounted to $26,567, and a five-year contract has been signed with a stock feed company whereby $21.65 will be paid into the city treasury for every ton of feed produced. The annual output is estimated at 3,000 tons.



THE McCULLOUGH-NOLAN DEWATERING DEVICE FOR GARBAGE COLLECTION TRAILERS

In 1926 the old reduction plant, conceded to be expensive in operation and inefficient, produced for Indianapolis a net profit in round figures of $29,000. In 1925 the net profit amounted to $20,105.84, while for the year 1923 the books of the board of sanitary commissioners show a net operating profit of $6,036.26.

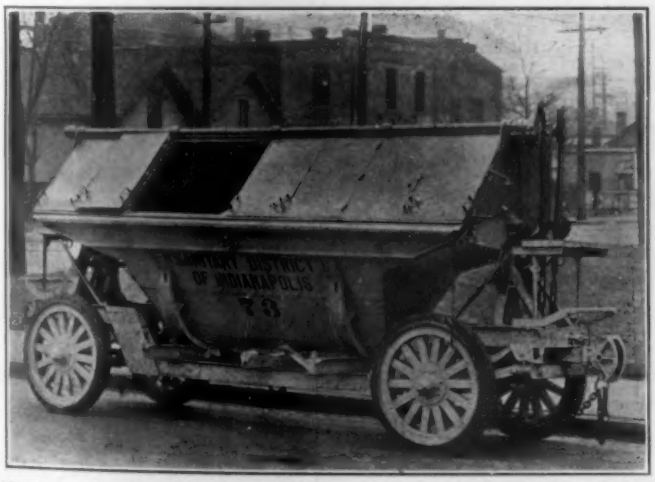
Years ago Indianapolis contracted with a private company for the collection and reduction of garbage, and when, in 1917, the contract expired, the city decided to take over and manage its own garbage reduction plant. Accordingly, the old plant was purchased for $175,000 and has continued in operation, managed by the Sanitary District of Indianapolis.

A board of three commissioners, consisting of an appointee of the State Board of Health, the city engineer, and the third, chosen by these two, are vested with the business of operating the plant.

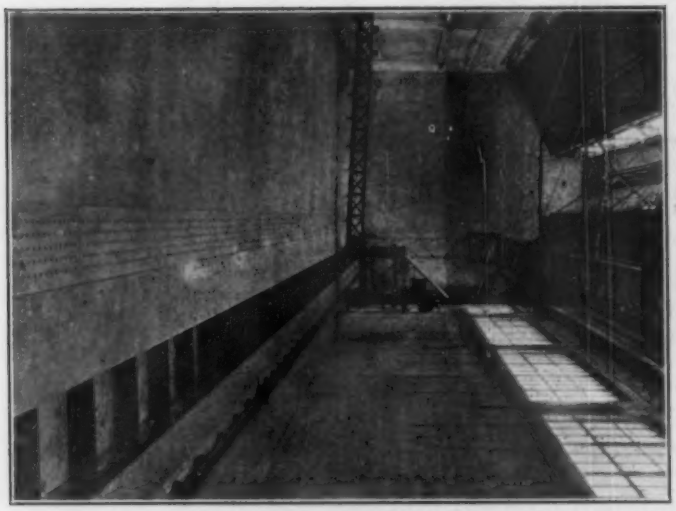
In 1922, experiments were begun on processes offering an improvement over the reduction process then used. E. W. McCullough, consulting engineer, his staff, and the board finally evolved a system now known as the McCullough process, and work on a new plant was begun shortly afterwards.

Improvement in Collection Equipment

While the McCullough process was in the course of experimentation it was found that garbage must be delivered to the plant in as dry a state as possible and not soured, if best results were to be secured. The outcome of this line of endeavor was the installation of steel collecting trailers equipped with a dewatering device known as the McCullough-Nolan patent. The device is simply a perforated false bottom to the trailer, and as the garbage is dumped from each household container and the trailer travels the alley route to the next house, the water is shaken out, draining into the receiving compartment under the perforated plate. To empty the water compartment, the collector opens a standard 2-inch molasses



THE TYPE OF COLLECTION TRAILER USED IN INDIANAPOLIS, SHOWING TIGHT-FITTING SANITARY COVER



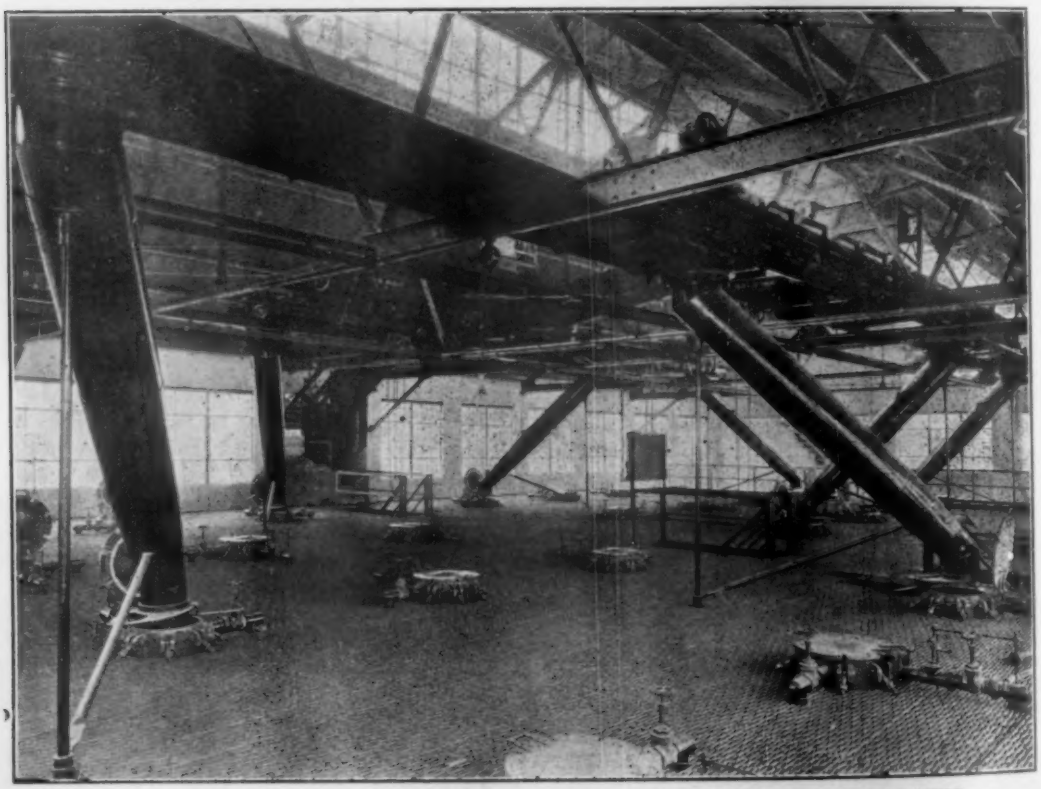
RECEIVING STATION WHERE GREEN GARBAGE ENTERS PLANT, SHOWING POWER SCRAPER, FLOOR CONVEYOR AND PERFORATED PLATES FACILITATING DRAINAGE OF SURPLUS WATER

cock, and drains the trailer into any convenient sewer manhole. In the course of collection the compartment may be drained three or four times and as much as 200 gallons of free water eliminated. The advantages include elimination of spillage along alleys and streets, less odor and fly nuisance, larger loads, increased capacity at reduction plant, better products, and larger profits.

Operation of New Plant

The new plant has been designed to operate with a minimum of hand labor and with utmost safety. There are no buried pipes or conduits. Everything is accessible and it is evident that precaution has been taken to insure operation at the utmost net profit.

Green garbage starts through the plant at the receiving station, where the trailers, previously mentioned, unload into a room of 400--ton capacity. Here again, dewatering of the green garbage takes place through a floor especially constructed to facilitate the drainage process. A special power scraper moves the mass of garbage to a floor conveyor capable of handling one ton per minute. One section of the receiving room is provided with the facilities for skinning animals whose hides have a commercial value, after which the car-



CHARGING FLOOR, WITH CONVEYING SYSTEMS USED TO FILL DIGESTER TANKS

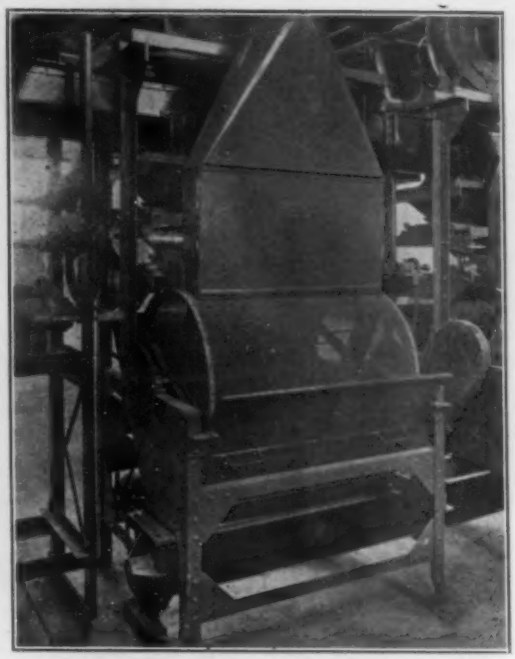
casses are cut up and passed on to the conveyor.

From the floor conveyor the mass passes to a belt conveyor and is automatically weighed as a check on efficient operation. The garbage next passes over a magnetic pulley equipped with an auxiliary magnetic unit which, by constant change of polarity, so agitates the cans and other metal articles present in garbage, as to rid them of adhering particles. The device also extracts the larger metal pieces. The material is then discharged into a cross-conveyor provided with a shuttle device to facilitate loading the thirty-two tanks in which digestion takes place. The loading spouts, each provided with a watertight cut-off, complete a conveying system free from spillage, dripping, or leaking, for the plant was designed to be a model of sanitation as well as efficiency.

The tanks are adaptations of rendering-tanks and have a capacity of 3.5 tons. They are provided with agitators and are steam-jacketed 42 inches from the base. The garbage is digested for two and a half hours by the introduction of live steam at a pressure of 80 or 90 pounds. When pressure is reduced, the blow-off is condensed to eliminate odors, and the liquid is decanted through pipes to strainers. This grease-bearing water passes to a sump, from which the grease is skimmed. The last of the water from the digested mass is forced out by steam applied from above. The door through which this mass eventually passes is provided with a screen which filters the residual water. The settling and steam pressing continues for about an hour and a half. This is followed by the drying-operation in the digester, accomplished by low-level jet condensers producing a vacuum of 26 inches. In these tanks the whole cycle of operations is performed without handling the charge until it is cooked and dried. This is important from a sanitary standpoint, and also eliminates the danger of burning and scorching the tankage.

A 15-horsepower motor is employed to turn the agitator in each tank. The agitator is out of contact with the bottom and walls of the tank, to avoid breakage of glass, china, etc. After about four hours of steam drying there is not more than 7 per cent moisture in the mass, and it is discharged to the dry floor conveyor and carried to the process building.

The material is next screened through a ¼-inch mesh. The coarse particles are carried in a trough conveyor to de-greasing tanks and then to the fertilizer filler storage bins. The fines which pass through the screen go to a screw conveyor and thence to a battery of McCullough separator machines ingeniously designed to separate rubbish from stock food values.



FRONT VIEW OF McCULLOUGH SEPARATOR, SHOWING REVOLVING SCREEN AND AIR SUCTION DEVICE

This is regarded the principal difference between the Indianapolis plant and those of other cities. A careful survey disclosed that fertilizer mixers were becoming more and more reluctant to purchase garbage tankage for filler, and engineers saw so great a decrease in the demand that there might even be difficulty in disposing of this product.

That garbage possesses high food value for stock has long been recognized, but difficulty in removing metals, glass, and such foreign substances always has been encountered. By the use, however, of screens, magnetic pulleys, and the McCullough separator less than one-tenth of one per cent of glass and no free metallics remains in the feed. In fact, a figure of 0.06 per cent is maintained in operation. This is in accord with state laws.

The fines carried to these separators by the screw conveyor are pushed in definite and constant quantities onto a baffle-board by a bar-and-chain conveyor. A fiber brush, engaging with the board, evenly distributes the material upon a revolving 28-mesh screen and projects the particles of glass and china through the screen to a tray below. Concurrently, fans create a regulated suction above the screen. This suction is adjusted to continuously pick

up food particles and leave behind, eggshells, coffee grounds, and such other undesirable materials.

The rubbish collected in the tray is run through the machine again and finally carried off to the de-greasing percolators. The food particles go to dust collectors and then are sacked automatically and placed in storage for shipment.

Before the coarse particles go to any of the four de-greasing tanks, they pass over another magnetic pulley where the last of the metallics are removed. The mass is dry-cleaned for grease, gasoline being used and reclaimed in a standard horizontal still. The grease goes to storage, while the fertilizer filler goes to a cage mill and screen where it is reduced to suitable size, and thence to storage, or to railroad cars. The filler adds humus to chemical fertilizers and also prevents burning of roots of crops.

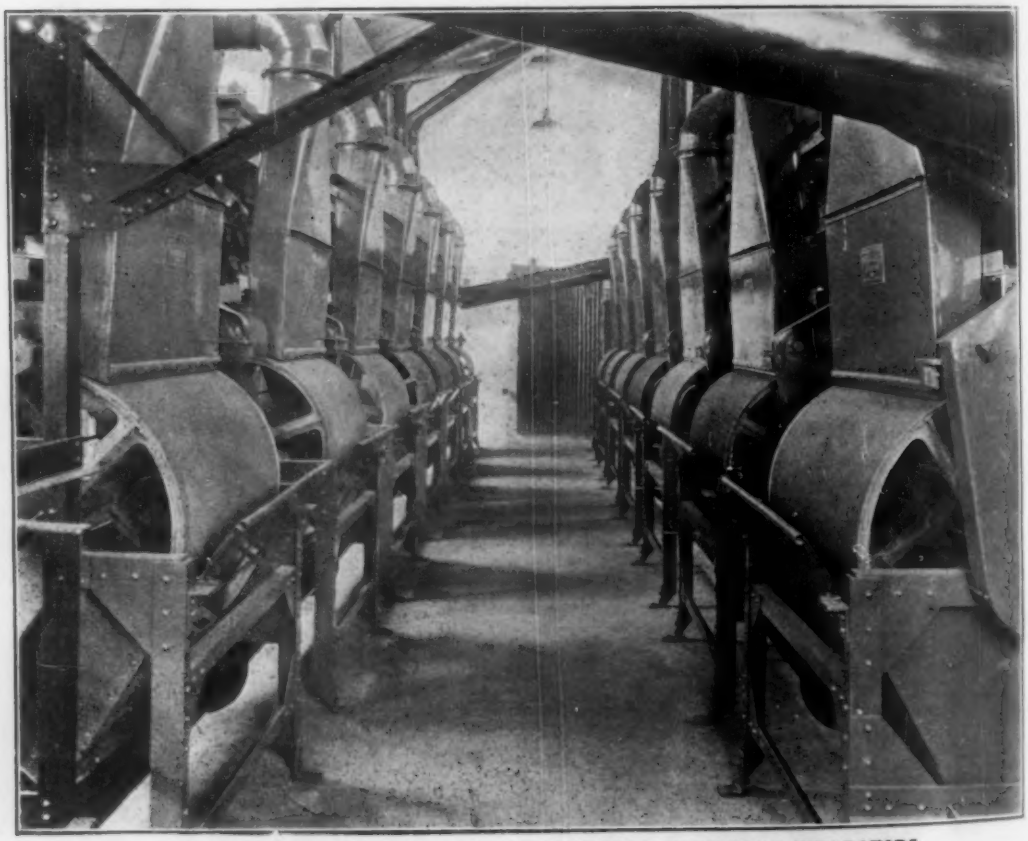
Table I gives an average example of results on china and glass in stock feed processed at the Indianapolis plant.

TABLE I

Batch No.	As Discharger from Tank Before Being Processed		After Processing		
	Per Cent	Lbs. per Ton	Per Cent	Lbs. per Ton	Ozs. per Ton
1262	1.06	21.2	0.012	0.24	3.8
1263	2.68	53.6	0.016	0.32	5.1
1264	1.01	20.2	0.010	0.20	3.2
1265	1.28	25.6	0.006	0.12	1.9
1266	0.93	18.6	0.013	0.26	4.2
1267	2.53	50.6	0.009	0.18	2.9
1268	2.26	45.2	0.018	0.36	5.8
1269	2.38	47.6	0.050	1.00	16.0
1270	2.22	44.4	0.044	0.88	14.1
1271	2.98	59.6	0.037	0.74	11.9

Conclusion

Summing-up a few of the important features of the plant, it is found that motors operating conveyors in the plant are so interconnected that congestion of material in the system is unlikely. The plant, if circumstances required, could be run with one charge for one digester every twenty-four hours. The conveyors are so arranged that any number of digesters may be brought into service. Seven tons of green garbage can be reduced in each digester every 24 hours. Irving subway flooring is used throughout, greatly facilitating ventilation, cleanliness, light and vision. Chemic enamel paint, a cement tile roof, and salt-glazed brick wall were selected, being non-absorbent.



REAR VIEW OF ONE OF TWO DOUBLE ROWS OF McCULLOUGH SEPARATORS

VIEW OF THE MANY AND VARIED ARTICLES FOUND IN INDIANAPOLIS GARBAGE LAST YEAR, INCLUDING ALMOST EVERYTHING FROM A PHONOGRAPH NEEDLE TO AN UNEXPLODED HAND GRENADE

According to figures made available by Mr. McCullough, 5.43 tons of green garbage will produce 1 ton of crude tankage. This will consist of approximately 14 per cent of coarse rubbish, 34 per cent fine rubbish, and 52 per cent of feed tankage. Approximately 40 pounds of free grease per ton of garbage is obtained by skimming-cookers. Because so large a proportion of the material dried in the direct-fire driers of the Chamberlain process is destroyed, tests show that in the new plant there is approximately as much fertilizer tankage as previously and that the tonnage of feed tankage will exceed that of fertilizer tankage. Grease is worth from 5 to 7 cents a pound, and the fertilizer filler about $4.50 a ton.

A comparison with the Chamberlain process, formerly used, gives this interesting data:

	Chamberlain Process	McCullough Process
Cooking-time	8 hrs.	2½ hrs.
Draining and pressing	5¼ hrs.	1½ hrs.
Discharging-time	40 min.	3 min.
Moisture in material discharged from digester	50 to 60%	6 to 7%

In conclusion, it is found that experimental work is still in progress at Indianapolis, for the sump in which water and grease from the digesters is decanted contains, after skimming off the grease, a water carrying all the water-soluble materials of the garbage. These include salts, starches, sugars, etc., and experiments so far conducted indicate that the material is well worth drying for its food values. This further measure of conservation doubtless will be taken when difficulties always attendant upon the opening of a new plant are ironed out.

Impartial audits by accountants reveal that from June 1 to August 31 the Indianapolis garbage reduction plant operated at a profit of $25,695.94, not deducting capital charges. Garbage collected during this period amounted to 10,300 tons and yielded 526 tons of fertilizer filler, 654 tons of stock feed, and 498,000 pounds of grease. Fertilizer brought $2,367.14, stock feed, $14,168.84, and grease, $26,567.04, making a total of $43,103.02. The total cost of production was $17,407.08. Even deduction of capital charges at the rates of 12 per cent per annum on $350,000, the actual cost of the plant exclusive of sundry equipment, leaves the net profit $15,195.94.

ACKNOWLEDGMENT.—The illustrations for this article are reproduced from original photographs obtained through the courtesy of the Logan Co., Louisville, Ky. This company constructed the McCullough separators and the entire conveying system now in successful operation at the new garbage reduction plant.

A New Traffic-Control System in San Francisco

By Miller McClintock

Director, Albert Russel Erskine Bureau for Street Traffic Research in Harvard University

Progress Toward Standardization of Traffic Ordinances

In at least five states—Michigan, California, Colorado, Illinois and Minnesota—leagues of municipalities, automobile clubs, and other state bodies are urging the adoption of uniform traffic ordinances which have been drafted to supplement the respective state vehicle codes. These model ordinances have been made available for the municipalities in pamphlet form, and in the first two states mentioned have already been enacted by numerous cities and villages.

During the week of the National Safety Congress in Chicago, September 25 to 30, 1927, several sessions were held of the national committee recently appointed by Secretary Hoover to draft a uniform traffic ordinance applicable as nearly as may be to all American cities. The committee, a list of whose members was published in The American City for August, 1927, is making excellent progress, but because of the magnitude of the task its final report can hardly be ready for several weeks. Its next meeting is scheduled for December 8 and 9 in Washington.

The full text of the Michigan ordinance was published in this magazine for September, 1926, pages 407 to 415. As a further aid to municipalities which may wish to adopt new traffic ordinances prior to the issuance of the committee's report, and as a means of stimulating discussion which may be helpful to the Hoover committee, The American City is here publishing the full text of San Francisco's new ordinance, which, as explained in the introductory statement by Miller McClintock, is based largely on the Uniform Traffic Ordinance for California cities above mentioned.

California has a state vehicle code which is practically identical with that advocated by and made available in pamphlet form by the National Conference on Street and Highway Safety. Cities in states which have not yet enacted the Standard Vehicle Code should, of course, give consideration to their existing state laws for control of motor vehicles; and until the standard vehicle code is adopted in such states, certain features of it may well be incorporated in local ordinances.

Suggestions intended for the new Hoover committee should be addressed to C. W. Stark, Secretary, Committee on Municipal Traffic Ordinances and Regulations, Department of Commerce, Washington, D. C.

THE Board of Supervisors of the City and County of San Francisco have approved of a traffic ordinance and plan of traffic control and administration that was presented to them after engineering investigation of local traffic conditions covering a period of approximately one year.

The survey of San Francisco traffic was conducted under the direction and through the financing of a group of citizens appointed as members of the San Francisco Traffic Survey Committee by the Mayor. The investigations upon which the report was based were comprehensive in their character, covering the various aspects of traffic congestion and accidents in the city. The recommendations of the committee are printed in a volume of approximately 350 pages with numerous charts and figures.

The conclusions cover various fields of traffic control and administration. The report outlines in detail a system of automatic, coordinated signal control for Market Street, together with a program of traffic signs and marking installations for the entire city. A division of street traffic engineering to be located in the Department of Public Works was recommended by the Committee and accepted by the administration. This bureau will be changed with the continued study of the traffic conditions within the city and especially with the design, installation and maintenance of traffic signs and signals.

The report also contains a traffic ordinance covering the various rules of driving throughout the city. This ordinance is printed in full below (with the exception of lists of one-way streets, those on which parking is prohibited, etc.). While the ordinance is designed primarily for the specific traffic conditions discovered by the investigation in San Francisco, it is based largely upon the provisions of the uniform ordinance for California cities, the most striking feature of which is a detailed regulation of relations between pedestrians and drivers of motor vehicles. With the adoption of the San Francisco ordinance, all of the larger cities in California and more than fifty of the smaller cities are now operating under ordinances that are practically identical.

EDITORIAL NOTE.—An Official Digest of the ordinance and of the state traffic regulations is obtainable in leaflet form from the California State Automobile Association, 150 Van Ness Avenue, San Francisco.

California's Uniform Traffic Ordinance

[Words in italics appear in the San Francisco ordinance but not in the uniform ordinance for smaller cities; while words in brackets appear in the smaller cities' ordinance, but have been omitted from the San Francisco ordinance.]

AN ORDINANCE regulating traffic upon the public streets and repealing all ordinances inconsistent herewith.

BE IT ORDAINED BY THE PEOPLE OF THE CITY AND COUNTY OF SAN FRANCISCO AS FOLLOWS:

Article I

DEFINITIONS

SECTION 1. Whenever in this ordinance the following terms are used, they shall have the meanings respectively ascribed to them in this section:

Street: Every way set apart for public travel except alley-ways, bridle-paths and footpaths.

Roadway: That portion of a street between the regularly established curb lines.

Alley: A public highway *with a roadway of less than 20 feet* [which does not exceed twenty feet between property lines].

Sidewalk: That portion of a street between the curb lines and the adjacent property lines.

Intersection: The area embraced within the prolongation of the property lines of two or more streets which join at an angle, whether or not one such street crosses the other.

Crosswalk: That portion of the roadway included within the prolongation of curb and property lines at street intersections, *and other places marked in accordance with the provisions of this ordinance.*

Safety Zone: That marked portion of a roadway reserved for the exclusive use of pedestrians.

Loading Zone: That space adjacent to a curb reserved for the exclusive use of vehicles during the loading or unloading of passengers or materials.

Vehicle: Every device or animal by which any person or property is or may be transported or drawn upon a street, excepting devices moved by human power or used exclusively upon rails. For the purpose of this ordinance a bicycle shall be deemed a vehicle.

Street Car: Every device traveling exclusively upon rails when upon or crossing a street, other than devices propelled by steam.

Pedestrian: Any person afoot.

Operator: Any person who is in actual physical control of a vehicle or street car.

Traffic: [Pedestrians,] vehicles and street cars, either singly or together, while using any street for purposes of travel.

Central Traffic District: That portion of this city bounded *by and including the following parts of streets* [and described as follows]:

Business District: The territory contiguous to a street when fifty per cent (50%) or more of the frontage thereon for a distance of three hundred (300) feet or more is occupied by buildings in use for retail or wholesale business; also any territory contiguous to a street which is immediately adjacent to or a continuation of a street within a business district when such territory is so designated by the *Police Department* [Board of Police Commissioners, or Chief of Police, or City Manager].

Right of Way: The privilege of the immediate use of the street.

Park: To stand a vehicle for a period of time greater than is reasonably necessary for the actual loading or unloading of persons or materials.

Official Warning and Direction Signs [and Signals]: All warning and direction signs and signals not inconsistent with this ordinance heretofore or hereafter placed or erected under this ordinance or by authority of the *Board of Supervisors* [City Council, or Board of Trustees].

Article II

AUTHORITY OF POLICE: TRAFFIC SIGNS AND SIGNALS

Obedience to Police

SECTION 2. Officers of the Police Department are hereby authorized to direct all traffic by means of visible or audible signal, and it shall be unlawful for any person to refuse or fail to comply with any lawful order, signal or direction of a traffic or police officer. It shall be unlawful for any *person* [minor] to direct or attempt to direct traffic, unless authorized to do so by order of the *Chief of Police* [Board of Police Commissioners, or Mayor, or City Manager].

Signs

SECTION 3. The *Board of Supervisors* [City Council, or Board of Trustees] shall by resolution determine and designate the character of all official warning and direction signs and signals. Subject to this selection, the *Police Department* [Board of Police Commissioners, or Chief of Police, or City Manager] is hereby authorized, and as to those signs required hereunder it shall be its [his] duty to place and maintain or cause to be placed and maintained all official warning and direction signs and signals. All signs authorized and required hereunder for a particular purpose shall be uniform.

No provision of this ordinance for which signs are required shall be enforceable against the alleged violator if at the time and place of the alleged violation the sign herein required is not in proper position and sufficiently legible to be seen by an ordinarily observant person.

Obedience to Traffic Signs

SECTION 4. It shall be unlawful for any operator or pedestrian to disobey the instructions of any mechanical or electrical traffic signal, traffic sign or marks upon the street placed in accordance with the provisions of this ordinance, provided every sign or mark made by the use of paint upon the curb shall bear thereon the official emblem of the *City of San Francisco* [Police Department].

No public utility or department in this city shall erect or place any barrier or sign unless of a type first approved by the *Board of Supervisors* [Board of Police Commissioners, or Chief of Police, or City Manager]. It shall be unlawful for any operator or pedestrian to disobey the instructions of any barrier or sign approved, as above provided, erected or placed by a public utility or by any department of this city.

Traffic Stop and Go Signal Legend

SECTION 5. Whenever traffic at any intersection is regulated by a stop and go mechanical or electrical signal, the following colors may be used, and none other, and those colors herein authorized shall indicate as follows:

Red, *or the word "Stop,"* except in flashing signals, requires that traffic shall stop and remain standing.

Green, *or the word "Go,"* requires that traffic shall move and continue in motion, except when stopped for the purpose of avoiding an accident or in the event of other emergency or when stopped at the command of a police officer.

Amber shall indicate preparation for a change in the direction of traffic movement. When amber is shown, no traffic shall enter the intersection until a green or "Go" signal is shown.

Bells.—The ringing of a bell in connection with any mechanical or electrical traffic signal shall indicate preparation for a change in the direction of traffic movement. When such bell is sounded, no traffic shall enter the intersection until a green or "Go" signal is shown.

The Police Department* Required to Establish Crosswalks

SECTION 6. *Police Department** is hereby authorized and required to establish and maintain and to designate upon the surface of the roadway, by appropriate devices, marks or white lines, crosswalks [approximately equal in width to the adjacent sidewalk at all intersections] *at all places* where in its [his] opinion there is particular danger to pedestrians crossing the roadway.

[When crosswalks are established and maintained outside the Central Traffic District or a business district, the Board of Police Commissioners, or Chief of Police, or City Manager shall, by appropriate devices, marks or white lines, mark and maintain along the surface of the roadway an arrow not less than twelve (12) inches wide in the shaft and not less than thirty (30) feet long, pointing in the direction of such crosswalk, together with the word "Slow" in block letters not less than twenty-four (24) inches high and not less than four (4) inches wide one hundred (100) feet distant from each crosswalk so established].

Display of Unauthorized Signs Prohibited

SECTION 7. It shall be unlawful for any person to place or maintain or to display any device, other than an official warning or direction sign or signal erected under competent authority, upon or in view of a street, which purports to be, or is an imitation of, or resembles, an official warning or direction sign or signal, or which attempts to direct the movement of traffic or the actions

* [Board of Police Commissioners, or Chief of Police, or City Manager]

of operators, and any such prohibited device shall be a public nuisance, and the *Police Department** may remove it, or cause it to be removed, without notice.

It shall be unlawful for any person to wilfully deface, injure, move or interfere with any official warning or direction sign or signal.

***Emergency* [Police and Fire] Vehicles Exempt from Certain Rules**

SECTION 8. The provisions of this ordinance regulating the movement, parking and standing of vehicles shall not apply to ambulances, [emergency] vehicles of the police *department* or *of the* sheriff's office, [or] of the fire department or of a public utility while the driver of any such vehicle is engaged in the necessary performance of [public] emergency duties.

Article III

PEDESTRIANS

Pedestrian's Right of Way at Intersection

SECTION 9. (a) It shall be unlawful for the operator of any vehicle or street car to drive into any crosswalk which is marked as provided in Section 6 of this ordinance, while there is in such crosswalk upon the half of the roadway upon which such vehicle is traveling any pedestrian engaged in crossing the roadway until such pedestrian shall have passed beyond the path of said vehicle.

(b) It shall be unlawful for the operator of any vehicle to drive into any unmarked crosswalk while there is in such crosswalk upon the half of the roadway upon which such vehicle is traveling any pedestrian engaged in crossing the roadway until such pedestrian shall have passed beyond the path of said vehicle, when the pedestrian shall indicate his intention to cross by a timely and continuous warning by holding up his hand, palm *out* toward approaching traffic.

(c) The operator of a vehicle shall stop before entering any crosswalk when any other vehicle proceeding in the same direction is stopped at such crosswalk *for the purpose of permitting a pedestrian to pass.*

(d) The foregoing provisions of this section shall not apply at intersections where traffic is being directed by an officer or a traffic stop and go signal, at which intersections the [mutual] rights of pedestrians and operators of vehicles shall be exercised under the direction of the officer or traffic signals.

Pedestrian's Limited Right to Use of Roadway

SECTION 10. When within the Central Traffic District or a business district, no pedestrian shall cross a roadway other than by a crosswalk.

Outside of the Central Traffic District or a business district no pedestrian shall cross a roadway other than by a route at right angles to the curb and when crossing at any place other than a crosswalk shall yield the right of way to all vehicles upon the roadway.

It shall be unlawful for any person to be in any roadway other than in a safety zone or crosswalk, provided that this provision shall not be construed to prevent the necessary use of a roadway by a pedestrian.

It shall be unlawful for any person to stand in a roadway for the purpose of or while soliciting a ride from the operator of any private vehicle.

Pedestrians to Obey Signals

SECTION 11. At intersections where traffic is directed by a traffic or police officer or by a traffic stop and go signal, it shall be unlawful for any pedestrian to cross the roadway other than with released traffic.

Pedestrians Standing on Sidewalks

SECTION 12. In the Central Traffic District or in any business district it shall be unlawful for any pedestrian to stand on the sidewalk, except as near as is practicable to the building line or the curb line.

Article IV

RULES FOR DRIVING

Method of Approach for Left Turn

SECTION 13. The operator of a vehicle intending to turn to the left at an intersection or into an alley or driveway shall approach the point of turning in the line of traffic next to the center of the roadway.

Method of Turning to Left at Intersections

SECTION 14. The operator of a vehicle in turning left at an intersection shall pass to the right of the center of the intersection before turning, except that where markers have been placed upon the intersction boundary lines to be crossed by the vehicle, the operator shall pass to the right of such markers.

Location of Turning Markers

SECTION 15. The *Police Department** is hereby authorized, and as to those intersections mentioned in paragraph (1) of this section it shall be its [his] duty to place or cause to be placed turning markers in intersections as follows:

(1) Within intersections where either intersecting roadway is less than 60 feet *in width* and in intersections where streets meet at other than right angles and in intersections where one street terminates in another, a marker shall be placed at every intersection of the medial line of each street, with the prolongation of the [property or the] curb lines of the intersecting street, or as near the intersecting point of said lines as may be practicable.

(2) Intersections other than those mentioned in paragraph (1) may be marked as provided in paragraph (1), or a single marker may be placed within such intersection at the intersection of the medial lines of the intersecting streets.

Left Turns Prohibited

SECTION 16. The operator of a vehicle shall not between the hours of seven (7) A.M. and six (6) P.M. of any day, *excepting Sundays* [except Sunday] *and legal holidays,* make a left turn *upon* [at any of the following intersections]. . . . Signs shall be erected and maintained designating the provisions of this section.

Method of Approach for Right Turn

SECTION 17. The operator of a vehicle intending to turn to the right at an intersection or into an alley or driveway shall approach the point of turning in the line of traffic nearest the right-hand edge or curb of the street.

When Right Turns May Be Made

SECTION 18. Within the Central Traffic District a right turn *may* [shall not] be made at [an intersection by the operator of any vehicle against a traffic signal] *controlled intersections only while a "Go" signal is given.* Elsewhere, after making a full stop at the [prolongation of the nearer property line of the intersecting street] *nearest intersection line* a right turn may be made [at an intersection by the operator of any vehicle against a traffic signal] *while either a Go or Stop signal is given,* subject to the rights of pedestrians.

[When] Turning Around at Intersections Prohibited

SECTION 19. The operator of a vehicle shall not within the Central Traffic District or any business district between the hours of seven (7) A.M. and six (6) P.M. of any day, except [Sunday] *Sundays or legal holidays,* turn such vehicle at an intersection in a complete circle or so as to proceed in the opposite direction.

Driving from Alleys

SECTION 20. The operator of a vehicle emerging from an alley, driveway or garage shall stop such vehicle immediately prior to driving onto a sidewalk or onto the sidewalk area extending across *an* [any] alleyway.

Vehicles Shall Not Be Driven on [Sidewalk] *Sidewalks Nor in Safety Zones*

SECTION 21. The operator of a vehicle shall not drive within any sidewalk area except at a permanent or temporary driveway, *nor upon any portion of the roadway which is designated and marked as a safety zone.*

The Police Department is hereby authorized to establish and maintain by signs, paint marks or other material, safety zones at such street car stops and at such other places as in its discretion require such safety zones.

Traffic Lanes

SECTION 22. *The Police Department is hereby authorized to mark traffic lanes upon the roadway where a regular alignment of traffic is necessary. Where such lanes have been marked and signs have been erected instructing the operators to keep in line, it shall be unlawful for any operator to fail to keep his vehicle within the designated boundaries.*

Certain Vehicles Prohibited in Central Traffic District [or Business District]

SECTION [22] 23. (a) It shall be unlawful for the operator of any of the following vehicles to drive the same in the Central Traffic District [or any business district] between the hours of seven (7) A.M. and six (6) P.M. of any day except [Sunday] *Sundays or legal holidays:*

(1) Any vehicle so loaded that any part of its load extends more than three (3) feet to the front or more than ten (10) feet to the rear of said vehicle, *or which with its load is more than eight and one-half* (8½) *feet in width.*

(2) *Any vehicle primarily designed or used for the purpose of advertising.*

(3) *Any vehicle used for the transportation of garbage, ashes or refuse.*

(4) *Any vehicle used primarily for the transportation of gasoline or fuel oil.*

[(b) The Board of Police Commissioners (Chief of

* [Board of Police Commissioners, or Chief of Police, or City Manager.]

Police) (City Manager) is hereby authorized to establish over an appropriate street or streets and to designate by appropriate signs, through traffic routes for the movement of vehicles of two (2) or more tons capacity designed for carrying merchandise, freight or material. When any such through traffic route or routes are established and designated by appropriate signs, the operator of any vehicle mentioned in this paragraph shall drive on such route or routes and none other except when it is impractical to do so or when necessary to traverse another street or streets to a destination for the purpose of loading or unloading, but then only by such deviation from the nearest freight route as is reasonably necessary.]

Arterial Streets **[Boulevard Stops]**

SECTION [23] 24. The following streets and parts of streets are hereby declared to constitute *arterial streets* [boulevards] for the purpose of this section: . . .

Every operator of a vehicle or street car traversing any street intersecting any *arterial street* [boulevard] shall bring such vehicle or street car to a full stop at the place where such street meets the prolongation of the nearer property line of such *arterial street* [boulevard] *or at such other place as may be indicated by a sign erected in accordance with this section*, subject, however, to the directions of any stop and go signal or police officer at such intersection.

The *Police Department* [Board of Police Commissioners or Chief of Police or City Manager] is hereby authorized and required to place and maintain or cause to be placed and maintained upon each and every street intersecting *an arterial street* [a boulevard] and at or near the property line of the *arterial street, suitable* [boulevard appropriate] signs *bearing the words "Arterial Stop"* [upon the street or devices or marks in the roadway, such signs, devices or marks to bear the word "Stop" or the words "Boulevard Stop" in such position and with letters of a size to be clearly legible from a distance of fifty (50) feet along the street intersecting the boulevard].

Restricted Traffic Streets

SECTION 25.* *The following parts of streets are designated as restricted traffic streets: . . .*

It shall be unlawful for the operator of any vehicle designed or used for the transportation of commodities or materials to operate said vehicle upon any restricted traffic street for a distance greater than one block or for any purpose other than to make a pick-up or delivery within said block.

One-Way Streets

SECTION 26. *Between the hours of seven (7) A.M. and six (6) P.M. of any day, excepting Sundays and legal holidays, it shall be unlawful for the operator of any vehicle to drive said vehicle in any part of any of the following streets except in the direction indicated herein: . . .*

Suitable signs shall be erected and maintained at all intersections of said parts of streets indicating the provisions of this section.

Following Fire Apparatus Prohibited

SECTION 27. It shall be unlawful for the operator of any vehicle, other than one on official business, to follow any fire apparatus traveling in response to a fire-alarm closer than one block or to park any vehicle within the block where fire apparatus has stopped in answer to a fire-alarm.

Crossing Fire-Hose

SECTION 28. No street car or vehicle shall be driven over any unprotected hose of the Fire Department when laid down on any street, private driveway or street car track [to be used at any fire or alarm of fire], without the consent of the Fire Chief [Marshal] or the assistant in command.

Sirens and Horns

SECTION 29. *It shall be unlawful for the operator of any vehicle to sound any "sirens" or other device which makes an unusually loud noise, or to sound any horn for an unnecessary length of time or for any purpose other than for warnings which are a necessary incident to the operation of the vehicle.*

Bicycle Riding Restricted

SECTION 30. It shall be unlawful to ride a bicycle upon any sidewalk. The rider of a bicycle upon a roadway shall ride as *near* [nearly] as practicable within five (5) feet of the right-hand curb or edge of the roadway except when passing a standing or other vehicle or making a left-hand turn at an intersection.

Riding on Handle-Bars Prohibited

SECTION 31. It shall be unlawful for the operator of any bicycle or motorcycle when upon a street to carry any other person upon the bar, handle or tank of any such vehicle or for any person to so ride upon any such vehicle.

Unlawful to Drive Through Funeral Procession

SECTION 32. It shall be unlawful for the operator of any vehicle to drive between the vehicles comprising *an authorized parade* [a funeral procession] *or to drive between the vehicles comprising a funeral procession*, provided that such vehicles are conspicuously so designated.

Clinging to Moving Vehicles

SECTION 33. It shall be unlawful for any person traveling upon any bicycle, motorcycle, or any toy vehicle to cling to or attach himself or his vehicle to any other moving vehicle or street car upon any roadway.

Use of Coasters, Roller Skates and Similar Devices Restricted

SECTION 34. It shall be unlawful for any person upon roller skates or riding in or by means of any coaster, toy vehicle or similar device to go upon any roadway or upon *any* [the] sidewalk in the Central Traffic District.

Article V

STOPPING, STANDING AND PARKING

Stopping Prohibited in Specified Places

SECTION 35. It shall be unlawful for the operator of a vehicle to stop such vehicle in any of the following places except when necessary to avoid conflict with other traffic or in compliance with the direction of a police officer or traffic sign or signal:

(1) In an intersection;

(2) In a crosswalk;

(3) Between a safety zone and the adjacent curb or within twenty (20) feet of a point on the curb immediately opposite the end of a safety zone;

(4) Within *twenty* (20) [thirty (30)] feet of an intersecting roadway [except busses at a designated bus stop].

(5) *Within twenty* (20) *feet of the entrance to any fire-station.*

Upon all streets within the Central Traffic District or any business district the *Police Department* [Board of Police Commissioners, or Chief of Police, or City Manager] shall designate the provisions of paragraphs (3) and (4) of this section by placing and maintaining red paint or other red material upon the entire curb surface within such areas, omitting any crosswalk area [or by placing and maintaining appropriate signs directing that the stoppng of vehicles is prohibited].

Standing for Loading Only in Certain Places

SECTION 36. (a) *During the times specified herein it shall be unlawful for an operator to stand a passenger vehicle for a period of time longer than is necessary for the loading or unloading of passengers, provided such loading or unloading shall not consume more than three minutes; nor for an operator to stand any commercial vehicle for a period of time longer than is necessary to load, unload, and deliver materials, provided that the loading, unloading and delivery of said materials shall not consume more than twenty minutes, in any of the following places:*

(1) *In any public alley in the Central Traffic District or in any business district during any hour of any day,*

(2) *In any loading zone, between the hours of seven* (7) *A.M. and six* (6) *P.M. of any day;*

(3) *At any place not to exceed seventy-five* (75) *feet along the curb before the entrance to any hospital during any hour of any day;*

(4) *At any place not to exceed seventy-five* (75) *feet along the curb before the entrance to any police station during any hour of any day;*

(5) *At any place not to exceed seventy-five* (75) *feet along the curb before the entrance to any hotel during any hour of the day;*

(6) *At any place not to exceed one hundred* (100) *feet from the intersection of any street with Market Street, from The Embarcadero to Van Ness Avenue, between the hours of seven* (7) *A. M. and six* (6) *P. M. of any day;*

(7) *At any place not to exceed seventy-five* (75) *feet along the curb before the entrance to any public building between the hours of seven* (7) *A.M. and six* (6) *P.M. of any day except Sundays and legal holidays;*

(8) *At any place not to exceed seventy-five* (75) *feet before the entrance to any theater during the hours said theater is open for business;*

(9) *At any place between the portal of any tunnel and the nearest street intersection, between the hours of seven* (7) *A.M. and six* (6) *P.M. of any day;*

(10) *At any place where the grade of the roadway exceeds twenty* (20) *per cent.*

(b) *It shall be unlawful for any operator of a vehicle to stand said vehicle in a duly established taxicab stand, provided, however, that this provision shall not apply*

* NOTE.—From this point the section numbers given are those of the San Francisco ordinance.

to the operators of duly licensed taxicabs authorized to occupy said stands.

(c) *Suitable signs shall be placed and maintained by the Police Department to designate the provisions of this section. The Board of Supervisors shall designate the location of loading zones as defined by Section I of this ordinance, provided that, in the Central Traffic District or in any business district as herein defined, a curb space not to exceed fifty* (50) *per cent of the total curb length of any street between intersections may be reserved for loading zones. A curb space not to exceed one hundred* (100) *feet may be reserved temporarily or in emergency by the Police Department at any place where required by public convenience.*

EDITORIAL NOTE. The following provisions, in brackets, constitute Section 32 of the smaller cities' ordinance, under the same section head:

[(a) It shall be unlawful for the operator of a vehicle to stop said vehicle for a period of time longer than is necessary for the loading or unloading of passengers or materials, provided that the loading or unloading of passengers shall not consume more than three (3) minutes, nor the loading or unloading of materials more than twenty (20) minutes, in any of the following places:

1. At any curb where the grade of the street exceeds twelve per cent (12%);
2. In any alley;
3. In any "loading zone";
4. At any curb within twenty-five (25) feet of a point on the curb opposite the center of the entrance to any hospital;
5. At any curb within fifty (50) feet of a point on the curb opposite the center of the entrance to any police station;
6. In any marked bus stop.

(b) The Board of Police Commissioners (Chief of Police) (City Manager) shall determine the location of "loading zones" and shall mark by appropriate signs or as specifically required herein those places where standing for loading only is permitted under this section, subject to the following requirements and limitations:

Bus stops shall be designated by appropriate signs at those places determined by (the public utility board) except that a bus stop shall not exceed fifty (50) feet in length and shall not be placed adjacent to a safety zone at a street car stop;

Every loading zone, also that portion of every curb reserved for loading only by paragraphs (4) and (5) of subdivision (a) of this section shall be designated by yellow paint or other yellow material upon the entire curb surface therein with the words "loading only" in black letters thereon;

Within (the Central Traffic District or) any business district not more than one-half of the total curb length in any one block may be set apart as a loading zone.]

Parking Prohibited on Certain Streets

SECTION 37. *Between the hours of seven* (7) *A. M. and six* (6) *P. M. of any day, excepting Sundays and legal holidays, it shall be unlawful for the operator of a vehicle to stop said vehicle for a period of time longer than is necessary for the actual loading or unloading and delivery of passengers or materials in any of the following places:*

. . . . . .

Signs shall be erected and maintained not more than one hundred fifty (150) *feet apart in each block designating the provisions of this section.*

Parking Time Limited in the Central Traffic District

SECTION 38*. *The operator of a vehicle shall not park such vehicle for longer than forty* (40) *minutes within the Central Traffic District between the hours of seven* (7) *A. M. and six* (6) *P. M. of any day, except Sundays or legal holidays, and subject to the special restrictions imposed by Sections 35, 36, and 37.*

Signs shall be erected and maintained not more than one hundred fifty (150) *feet apart in each block designating the provisions of this section.*

Parking Time Limited in Business Districts

SECTION 39*. *The operator of a vehicle shall not park such vehicle for longer than sixty* (60) *minutes within any business district between the hours of seven* (7) *A. M. and six* (6) *P. M. of any day, except Sundays or legal holidays, and subject to the special restrictions imposed by Sections 35 and 36.*

Signs shall be erected and maintained not more than one hundred fifty (150) *feet apart in each block to designate the provisions of this section.*

*In the Uniform Traffic ordinance for California Cities, these two sections are combined into one, under the heading "Parking Time Limited in Specified Places."

Early Morning Parking Limited

SECTION 40. It shall be unlawful for the operator of any vehicle to park said vehicle on any street for a period of time longer than one (1) hour between the hours of [. . . .] *three* (3) A. M. and [. . . .] *five* (5) A. M. of any day.

Standing or Parking Close to Curb

SECTION 41. The operator of a vehicle shall not [stop] stand or park such vehicle in a roadway other than parallel with the curb and with the two right-hand wheels of the vehicle within one (1) foot of the regularly established curb line, except that upon those streets which have been marked for angle parking, as provided in this section, vehicles shall be parked at the angle to the curb indicated by such marks.

The *Police Department* [City Council, by resolution, or the Board of Police Commissioners, or Chief of Police, or City Manager] is hereby authorized to determine upon what streets angle parking shall be permitted and to indicate such places by the placing of white lines upon the surface of the roadway to indicate the proper angle for parking, provided that such lines shall not be placed upon, nor shall angle parking be permitted upon, any street where such parking would diminish the width of the roadway available for travel to less than twenty (20) feet, nor upon any street where there is less than thirty (30) feet between the curb and the nearest rail of any street car track, nor upon any *arterial* street [which is a continuation of or part of a county trunk line highway or a state highway unless a clear width of forty (40) feet is left for the movement of vehicles when angle parking is permitted].

[The Board of Police Commissioners (Chief of Police) (City Manager) is hereby authorized to prohibit the parking of vehicles, provided appropriate signs are placed and maintained to give notice thereof, on one side of a street in any block where angle parking is permitted on the opposite side of the street in such block.]

Parking on Grades Regulated

SECTION 42. *It shall be unlawful for an operator to stand or park any vehicle upon any street the grade of which exceeds five* (5) *per cent, without setting the brakes thereon, and blocking the wheels of said vehicle by turning them against the curb, or by other means.*

Parking Vehicles for Sale

SECTION 43. It shall be unlawful for the operator of any vehicle to park the same upon any street for the purpose of displaying it for sale, or to park any vehicle upon any street in the Central Traffic District or any business district from which said vehicle merchandise is being sold.

EDITORIAL NOTE.—The Uniform Traffic Ordinance for California Cities contains provision for a section (37) on Parking of Taxicabs Restricted.

Article VI

STREET CARS

Rules Applicable to Vehicles Passing Street Cars

SECTION 44. The driver of a vehicle overtaking any railway, interurban or street car stopped or about to stop for the purpose of receiving or discharging any passenger, shall bring such vehicle to a full stop at least ten (10) feet in the rear of such street car and remain stationary until any such passenger has boarded such car or reached a place of safety, except that where a safety zone has been established, or at an intersection where traffic is controlled by an officer or a traffic stop and go signal, a vehicle need not be brought to a full stop before passing any such railway, interurban or street car, but may proceed past such car at a speed not greater than is reasonable or proper and in no event greater than ten (10) miles an hour and with due caution for the safety of pedestrians.

Driving on Street Car Tracks, Passing Safety Zones

SECTION 45. (a) It shall be unlawful for the operator of any vehicle proceeding upon any street car tracks in front of a street car to fail to remove said vehicle from said tracks as soon as practicable after signal from the operator of said street car.

(b) *On Market Street from The Embarcadero to Van Ness Avenue, it shall be unlawful to drive any vehicle to the left of any safety zone established at a regular street car stop.* [It shall be lawful for a vehicle to be driven on either side of a safety zone.]

It shall be unlawful to drive any vehicle to the left of any safety zone established in the city if the roadway to the right of said safety zone is immediately available for travel.

Street Car Speed

SECTION 46. The operator of a street car upon a street shall operate the same at a careful and prudent speed, and subject to this limitation may lawfully proceed at a speed not exceeding the following:

(1) **Fifteen (15) miles per hour:**
(a) **In a business district;**
(b) **When passing a school while persons are entering or leaving the grounds;**
(c) When traversing curves where the operator does not have an unobstructed view along the tracks for a distance of two hundred (200) feet;
(d) When traversing an intersection of highways where the operator during the last one hundred (100) feet of his approach to the intersection does not have a clear and uninterrupted view of such intersection and of the traffic upon all of the highways entering such intersection for a distance of two hundred (200) feet from such intersection;
(2) Twenty (20) miles per hour in a residence district;
(3) *Forty* (40) [Thirty-five (35)] miles per hour under other conditions.

Speeds in excess of those set forth above shall be taken as prima facie but not as conclusive evidence of a speed greater than is reasonable and proper.

Boarding or Alighting from Street Cars or Vehicles

SECTION 47. It shall be unlawful for any person to board or alight from a street car or vehicle while said street car or vehicle is in motion.

EDITORIAL NOTE.—The following sections, numbered as given, occur in the smaller cities' ordinance.

[Riding on Car Steps

SECTION 42. It shall be unlawful for any person to ride upon the fender or running-board of any street car or vehicle.]

[Railway Trains and Street Cars Not to Block Street

SECTION 43. It shall be unlawful for the operator of any steam, interurban or street railway train or car to operate the same in such a manner as to prevent the use of any street for purposes of travel for a period of time longer than five (5) minutes.]

Article VII
PENALTIES

Penalty

SECTION 48. Any person violating any of the provisions of this ordinance [or any rule or regulation made by the Board of Police Commissioners, (Chief of Police) (City Manager) pursuant thereto], shall be punished for the first offense by a fine not to exceed fifty (50) dollars, or by imprisonment in the city jail for not more than five (5) days; for a second offense within a period of one (1) year from the date of the first offense by a fine not to exceed one hundred (100) dollars, or by imprisonment in the city jail for not more than ten (10) days, or by both such fine and imprisonment; for a third and each additional offense committed within one (1) year from the date of the first offense by a fine not to exceed three hundred (300) dollars, or by imprisonment in the city jail for not more than three (3) months, or by both such fine and imprisonment.

Disposition of Fines and Forfeitures

SECTION 49. All fines [or forfeitures] collected upon conviction *of and all forfeitures of bail collected upon default* [or upon the forfeiture of bail] of any person charged with a violation of any of the provisions of this ordinance shall be paid into the *treasury of the City and County of San Francisco, and placed temporarily to the credit of the Unappropriated Fee Fund and after settlement of the said Fund between the Treasurer and Auditor, deposited by the Treasurer in the General Fund* [city treasury and deposited in a special fund, which is hereby created, to be known as the "Street Improvement Fund." There may be appropriated out of said fund such moneys as from time to time may be authorized by the Council (Board of Trustees) for the purchase and maintenance of official traffic signs, signals, lights, and paint marks necessary to designate the provisions of this ordinance, and the balance of said fund shall be used exclusively in the construction, maintenance and improvement of public streets within this city]. *The Auditor shall furnish to the Board of Supervisors, on the first of each and every month, a statement showing the amount of all moneys collected during the previous month, under and by virtue of this section.*

Effect of Ordinance

SECTION 50. If any section, sub-section, sentence, clause or phrase of this ordinance is for any reason held to be unconstitutional, such decision shall not affect the validity of the remaining portions of this ordinance. The *Board of Supervisors* [City Council, or Board of Trustees] hereby declares that it would have passed this ordinance and each section, sub-section, sentence, clause and phrase thereof, irrespective of the fact that any one or more sections, sub-sections, sentences, clauses, or phrases be declared unconstitutional.

Repeal

SECTION 51. Ordinance No. [. . . .] *1857 (New Series)* as amended [(former traffic ordinance of the city)] is hereby repealed, and all ordinances or parts of ordinances in conflict with or inconsistent with the provisions of this ordinance are hereby repealed, except that this repeal shall not affect or prevent the prosecution or punishment of any person for any act done or committed in violation of any ordinance hereby repealed prior to the taking effect of this ordinance.

Publication of Ordinance

SECTION 52. The *Clerk of the Board of Supervisors* [City Clerk] shall certify to the passage of this ordinance and cause the same to be published [in the . . . . .].

Road-Show Hotel Reservations

THE Hotel Committee of the American Road Builders Association has announced that it will function right up to the middle of the week of the Road Show, to be held in Cleveland, Ohio, January 9-13, 1928. Those attending the Road Show instead of wandering about from one hotel to another in search of accommodations, will be assigned to a room immediately through the Housing Bureau. This bureau will be materially helped by early reservations on the part of engineers and contractors for whom a large number of hotel rooms are being reserved. Address Hotel Committee, American Road Builders Association, 304 Chamber of Commerce Building, Cleveland, Ohio. Room reservations have been so arranged that it is now possible to state definitely that visitors can be accommodated without undue taxing of the city's facilities, according to the Hotel Committee.

Census Bureau Requests Cooperation of Cities in Preparation of Financial Statistics

IN a statement to THE AMERICAN CITY accompanying the statistics published on pages 784-789 of this issue, the United States Bureau of the Census says:

"Financial statistics of the cities having a population of over 30,000 have been collected since 1903, but because of the diversified accounting systems in the 250 cities in this class it is still necessary to have agents visit most of these cities to prepare the reports.

"The Bureau of the Census advocates a simple, logical, and comprehensive classification of accounts, the use of which would permit obtaining readily accurate and comparable data. It requires only that the accounting official segregate receipts and payments under proper headings, showing the sources of revenue and the objects of expenditure. This can be done in any city without changing the present system of accounting.

"The cooperation of city officials in establishing a uniform classification of accounts would make it possible for the Bureau, without greatly increasing expenditures, to collect statistics on this important subject for practically all cities in the United States."

Methods of Figuring Water and Sewerage Costs in Maryland

By Abel Wolman

Chief Engineer, Maryland Department of Health, Baltimore, Md.

THE data herein presented run the gamut of every form of payment for capital investment, from the universal one of general property taxation to the specialized one of front-foot assessment, with intermediate combination of all current forms of financing. In some instances two diametrically opposite procedures are in force in two political entities separated only by an imaginary line, popularly described as a "political boundary." As wide apart as the principles are in as small a state as Maryland, there are interesting and frequently valid explanations of the differences, although sometimes the historical reviewer may be driven to explaining them as due to the relative humidities of the atmosphere rather than to any apparent differences in causative facts.

A Logical Plan for Payment

It is helpful in reviewing the data later to be presented to outline briefly the principles of financing which the State Department of Health has suggested for the past ten years.

It has been assumed that any plan for meeting both capital and operating costs of water and sewerage systems should provide for rigid separation of public and private benefits and for fairly complete differentiation between fixed and operating charges. Following these two primary principles, in general, the installation of water-supply and sewerage systems in Maryland was designed to be paid for by a combination of general property tax, annual front-foot assessment during the term of the bonds issued, cash payment for house connections, meter service charge, sewer service charge and water consumption charge. The allocation of these charges was proposed in the following general form.

1. Fixed Charges

a. *The general or property tax* pays for that part of the cost of water and sewer construction which may be assumed to be of value to all the taxable property. Such property would normally include reservoirs, pumping-stations, treatment works, supply and outfall lines, and sizes of mains in excess of those normally used locally for water distribution and sewer collection.

b. *Front-foot assessments* are ordinarily expected to provide the revenue for paying the cost of construction of water and sewer lines that abut upon the particular properties and that are of special or individual value to such properties. Ordinarily, such assessments would cover the costs of a 6- or 8-inch water-main or an 8-inch sewer line. In all instances, under the plan recommended by the State Department of Health, such front-foot assessments represent the interest and sinking-fund on the costs indicated above. These funds are provided through bonds, for terms usually from 30 to 50 years.

c. *The house connection charge* is usually a cash payment and covers the cost of the water or sewer connection from the main to the property line. In some instances it may be continued over more than one year. Some consideration has been given to distributing this charge over the entire term of the bonds.

2. Maintenance and Operation Costs

d. *The meter service charge* covers the ready-to-serve portion of the operating cost.

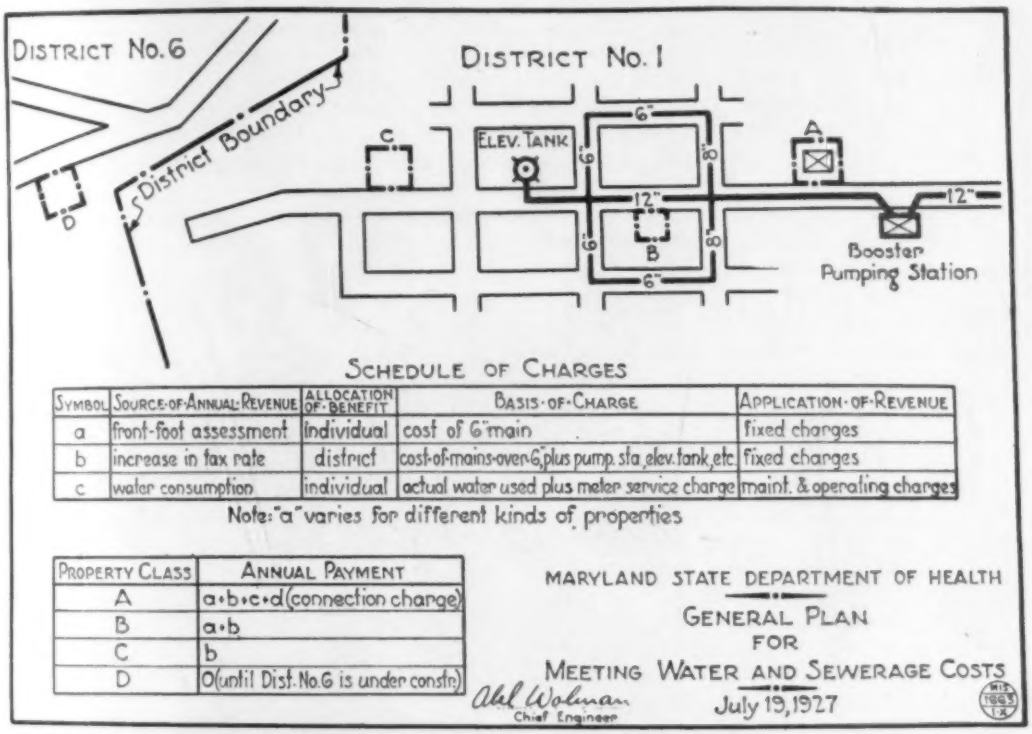
e. *The water consumption charge* provides for the fluctuating costs of maintenance and operation of the water-supply service.

f. *The sewer operating charge* provides for the fluctuating costs of maintenance and operation of sewerage services. It may be included in the two water charges.

It should be clear from the foregoing analysis that these arrangements for supporting municipal utility costs are consolidations of the more familiar procedures of general taxation, or special assessments or rates based upon service. The use of any one of these methods to the exclusion of either of the others has been discarded on the score that no single one of them meets all the requirements of equity or logic in the development of municipal systems.

As a result of the application of these methods of financing, from 1918 to the end of 1926, 2¾ million feet of water and sewer lines have been constructed in the state of Maryland, for which the greater portion of the payment has been met through the continuing annual front-foot assessments. It may be stated at this time that, barring minor disabilities and neces-

sary adjustments for particular localities, all of which will be discussed below, the procedure of financing water-main and sewer-line construction by the front-foot assessment method has proved eminently successful. As far as we are aware, this application of the opportunity of distribution of charges between various classes of benefits and properties has been worked out in no instance on as wide a construction scale as in this state. There are, of course, excellent examples of extensions to existing systems being carried out on the front-foot assessment plan, but this procedure is distinctly different from the programs herein outlined as applied to newly created systems of large size.


DISTRICT No. 6
DISTRICT No. 1
District Boundary
ELEV. TANK
A
B
C
D
6"
8"
12"
Booster Pumping Station
SCHEDULE OF CHARGES
Symbol | Source of Annual Revenue | Allocation of Benefit | Basis of Charge | Application of Revenue
a | front-foot assessment | individual | cost of 6" main | fixed charges
b | increase in tax rate | district | cost of mains over 6", plus pump. sta., elev. tank, etc. | fixed charges
c | water consumption | individual | actual water used plus meter service charge | maint. & operating charges
Note: "a" varies for different kinds of properties
Property Class | Annual Payment
A | a+b+c+d (connection charge)
B | a+b
C | b
D | 0 (until Dist. No. 6 is under constr.)
MARYLAND STATE DEPARTMENT OF HEALTH
GENERAL PLAN
FOR
MEETING WATER AND SEWERAGE COSTS
Abel Wolman
Chief Engineer
July 19, 1927

PLAN WITH SCHEDULE OF CHARGES, SHOWING METHOD OF ASSESSING WATER AND SEWERAGE COSTS

The statistical material which the writer presents on page 766 illustrates the wide variation in practice which exists and will probably continue to exist in the state in the financing of municipal sysems. As pointed out before, the variations are the result, in some cases, of historical precedent and antagonism to change, and, in other cases, of efforts to meet the distinctly variable psychologies in different areas of the same state. An apparent fear of general taxation in one area prevents the application of general taxation as one source of revenue, whereas in other areas in the same state and not more than 40 miles away, the reverse procedure is accepted. We have the picture likewise in one undertaking, where the entire accounting and technical procedure was formulated looking toward the establishment of both front-foot charges and general taxation for the payment of the municipal water and sewerage system and was then completely overturned within 24 hours in favor of financing the entire program by general taxes. The underlying psychologies, the perspectives as to political expediency, an honest difference of opinion stubbornly maintained in one section regardless of the practice or experience in another, are all non-technical phases of water-supply and sewerage situations which offer an attractive field for study. They cannot be ignored in such a discussion as this, because in practice they control, regardless of the scientific and logical attributes of any scheme of financing.

What Do the Systems Cost?

A surprising amount of energy may be expended by the curious individual who takes it on himself to search out the paths through which the various contributions from the taxpayer and the consumer pass in finally reaching the funds supporting these municipal utilities. There are relatively few instances in

TABLE 1—COST OF MUNICIPAL WATER AND SEWERAGE SERVICE IN MARYLAND, 1925-1926

Place	Residential Front-Foot Assessment Water & Sewer		Direct Tax Per $100		Service Charges		Fire-Hydrant Rental per Year (each)	Water Consumption Charge	1925-1926 Total Annual Cost of Water and Sewer Service 50′ Lot—Consump.—40,000 Gal. Year		Connection Charges		
					Water Total	Sewer Total			Assessment				
	Rate	Total	Rate	Total					$3000	$5000	Water	Sewer	Total
		1		2	3	4	5	6	Add Columns 1-6 Inc.		7	8	7+8
Baltimore County Metropolitan District	$.30	$15.00	..	..	$6.80 City owned Mains $2.40 County owned Mains	No Rate to Date Towson = $11.25 Yr.	$24.00 Probable Yearly Cost per Property = $1.00	$.20 per 100 c. f. City owned Mains = $10.66 $.15 per 100c.f. County owned Mains = $8.00	$33.46 on "E" City owned Mains $26.40 on County owned Mains	$33.46 on "E" City owned Mains $26.40 on County owned Main	$18 or $20 Depending on Paving	$15 Minimum charge $1 per ft. in excess of 15′	$33 or $35
Hagerstown	..	..	26c	$7.80 13.00	..	$10.00	..	$.30 per M. Gal. per month up to 3333 Gal. "C" = $12.00	$29.80	$35.00	$7.00 plus $.20 per ft. say $13.00	$15.00	$28.00
Baltimore	..	..	6c Wat. 18c for San. Sew. Only Tot. = 24c	$7.20 12.00	..	..	..	Aver. $12.00 for Flat Rate $2.00 per 1000 c. f. for first 5000 c. f. = $10.66	$19.20 "A" 17.86 "B"	$34.00 "A" 22.66 "B"	$20, 24 or $28 Depending upon Paving	..	$20 $24 or $28
Elkton	..	..	11.5c	$3.45 5.75	..	..	..	Flat Rate = $21.20 $.25 per M. Gal. for first 5000 $.20 per M. Gal. for next 5000 Quarterly, $9.00 Yr.	$24.65 "A" 12.45 "B"	$26.95 "A" 14.75 "B"	$10.00 to Curb	$10.00 to Curb	$20.00
Frederick	..	"D"	..	..	$3-Bath + $3-Toilet = $6.00	"D"	..	$.25 per M. Gal. per 6 months up to 25,000 Gal. = $10.00	"D" $16.00 Water Only	"D" $16.00 Water Only	Approx. $2.00	..	Approx. $2.00
Cumberland	$2.00 per foot for 50′ Lot = $100.00 Flat Charge Sewers Only Prob. Equivalent $.12 $6.00		..	..	..	..	..	Flat Rate = $27.50 5000 Gal. or less per month at $.25 M. = $10.00 Min. Charge = $12.00	$33.50 "A" 18.00 "B"	$33.50 "A" 18.00 "B"	$15.00 for Meter in City $10.00 for Tap Outside City	$15.00 $30.00	$30.00 in City $40.00 Outside
Salisbury	..	..	24c	$10.20 17.00	$4.00	..	..	Flat Rate = $15.00 $.20 per M. Gal. = $8.00	$29.20 "A" 22.20 "B"	$36.00 "A" 29.00 "B"	..	..	..
Washington Suburban Sanitary District	$.26 "F"	$13.00	5c	$1.50 2.50	$4.00	..	..	$.18 per M. Gal. = $7.20	$25.70	$26.70	$35.00	$35.00	$70.00
Anne Arundel Co. Sanitary District 1—Overlook Dist. 2—Glenburnie Dist. 3—Linthicum Dist.	$.28 .27 .26	$14.00 13.50 13.00	5c	$1.50 2.50	..	..	..	Flat Rate = $15.00 $.40 per M. Gal. for first 10,000 Quarterly = $16.00	1 { $30.50 "A" 31.50 "B" 2 { 30.00 "A" 31.00 "B" 3 { 29.50 "A" 30.50 "B"	1 { $31.50 "A" 32.50 "B" 2 { 31.00 "A" 32.00 "B" 3 { 30.50 "A" 31.50 "B"	..	..	..

"A" Cost when water service is on flat rate. "B" Cost when water service is metered. "C" Does not include payments on new loans. "D" No sanitary sewers in Frederick—Combined sewers in part of area. "E" No sewer service charge as yet. Will approximate $5.00 per house. "F" Maximum, some lower.

which those contributions by the taxpayer and the consumer are obviously being devoted to water and sewerage purposes. This frank state of affairs does exist in a number of instances, particularly in the newly formed metropolitan districts, where, of course, the revenues are all devoted to these sanitary purposes. In a municipality like Baltimore, however, it is not always immediately apparent whether or not the so-called water rents fully provide for the water costs. Inasmuch as no sewerage service charge is in vogue in Baltimore City, the search for the cost of such service to the taxpayer leads into the complication of the general tax bill, in which records one must tread warily.

After considerable manipulation, search, discussions and adjustments, we present, in Table 1, a fairly accurate picture of the municipal water-supply and sewerage costs of somewhat over one million people in the state of Maryland. This tabulation gives a characteristic picture of the state of affairs for practically the entire urban population of the state, because a large proportion of the remaining 500,000 persons residing in the state are scattered in the communities of semi-urban or rural character.

Several features of the data in Table 1 should be pointed out in more detail. Attention is called to the fact that the procedure of payments shown for the Baltimore County Metropolitan District is decidedly distinct from that used in the adjacent territory in Baltimore City. We have the anomalous situation in these two groups of two populations being supplied by Baltimore City water and separated from each other by nothing more than a purely imaginary line. Three systems of payments are in use in the two areas: (1) the general taxation and water-rent plan in Baltimore City; (2) the more detailed plan in the County Metropolitan District on Baltimore City-owned mains; and (3) the Metropolitan District plan on mains owned by the Metropolitan District. The financial plan inaugurated in Baltimore County appears to the writer to be the only one which would have made it possible to provide water and sewerage facilities in an area having a scattered population and virtually completely encircling the Baltimore City boundary line. Although the direct property tax has not yet been used in the Baltimore County Metropolitan District, it is probable that it will be instituted as further progress on the construction program is made and a greater area is covered.

In Baltimore City the situation, particularly in the newly annexed territory, is not satisfactory, from the standpoint of adequate fiscal program, because the large bond issues for water-supply and sewerage purposes made necessary by the demands in these growing areas, are being financed out of general taxation. The major portion of such taxation is naturally falling upon the taxpayer of the old city whose benefits therefrom are, to say the least, somewhat remote.

The experience in Salisbury with the attempt to finance their new water-supply and sewerage systems on the joint basis of front-foot assessments and direct taxation is of special interest. In this case, local authorities are of the feeling that the detailed accounting and technical service necessary to set up a financial scheme predicated upon front-foot charges is far more costly than the benefits which would be derived from the choice of this particular method. In view of the fact that there may actually be, in the administration of such projects for communities under, say, 15,000 population, a diminishing return in the use of the front-foot method, we have in recent years provided in most legislation for small towns the alternative of general taxation or a combination of the procedures already described above. There is no escape from the fact that the assessment procedure involves a number of details of administration which may be too cumbersome for the small community, although its advantages, for equity of burden, are so great that it should not be discarded without careful consideration. Although the amount of effort is great in collecting the necessary information as to the ownership of all taxable property; its quantity, character and value; the systematic recording of that information; the analysis of the information; the equitable application of the results; and the compilation of a comprehensive assessment role, the results in fair charges and incidentally valuable data are likewise great.

Where our concern is not only that of establishing a sane and economical procedure of financing, but also of having that procedure fully understood and completely accepted, we have always been confronted with the necessity of clarifying these concepts in a manner likely to produce satisfaction. The objections to the front-foot method are in most instances of a minor character, but they create a great deal of opposition unless these objections are promptly and completely eliminated. We have found that the graphical presentation of these facts in the form shown on page 765 is decidedly helpful.

Refinements in the application of the front-foot procedure, such as gradations in front-

"A" Cost when water service is on flat rate. "B" Cost when water service is metered. "C" Does not include payments on new loans. "D" No sanitary sewers in Frederick—Combined sewers in part of area. "E" No sewer service charge as yet. Will approximate $5.00 per house. "F" Maximum, some lower.

foot benefit charges for different classifications of properties, always offer opportunities for manipulation, adjustment and opposition. Such classifications are inherently legitimate and practically essential, although we know of no single greater source of irritation than ill-advised calculations of front-foot assessments, where errors or differences in judgment as to classifications, benefits, etc., are unavoidable. These confusions and antagonisms are not surprising when it is remembered that any scheme of financing is not susceptible to complete mathematical analysis with the probable errors reduced to a minimum. All such allotments require judgment. The infallibility of human judgment is well known and the contentiousness of one or two taxpayers is just as familiar.

The data in Table I give emphasis to the fact long known to water-works men that few commodities are as cheap as these municipal utilities. Regardless of the system of payment in use, the total ultimate annual cost to the consumer for water and sewerage service is remarkably low. It is still a mystery why these costs are subject to so much antagonism in most cases. The average man's cigars cost twice as much each year. The real values of the two groups of commodities are hardly comparable.

Although the total annual costs in each of the instances in Table 1 are low, the inequalities in financial methods are best shown by comparison of the two columns under property valuations of $3,000 and $5,000.

Some Reflections on the Front-Foot Assessment

Practically all of the sanitary districts in the state of Maryland have passed through the Court of Appeals for testing one phase or another of their financial plans. Some of the decisions and the associated aspects of these tests are of general as well as of local interest. In practically each case it has been decided that the Public Service Commission of Maryland has no jurisdiction over matters involving the administrative functions of the sanitary commissions, covering such matters as the classification of property, the design of water and sewerage facilities, etc. In the case of the Washington Suburban Sanitary Commission and the Anne Arundel County Sanitary Commission, the amounts of general taxes and of front-foot assessments are subject to review by the Public Service Commission. This is not, however, the case in the Baltimore County Metropolitan District.

Determination of Amount.—Some difficulty has been occasioned through the failure of administrators to determine at the beginning of the project an amount for the front-foot assessments which during the later development of the project would be found to be insufficient to meet the demands of outstanding charges. Some confusion exists at this time in the Court of Appeals decision, in the case of the Washington Suburban Sanitary District, as to whether a front-foot assessment once established may later be increased by the Sanitary Commission. The Commission has endeavored to meet this situation by new legislation in 1927 in which the specific amount of the front-foot assessment has been established by the State Legislature.

In the Baltimore County Metropolitan District, adjustments of the front-foot assessments from year to year are provided by law, and the Court of Appeals in 1927 decided that such adjustments are within the province of the administrative authorities as functions delegated to them by the State Legislature. In other words, the establishment of such front-foot assessments has been interpreted by the Court of Appeals as simply an extension of the taxation powers of the County Commissioners assigned to them under the provisions of the state constitution by the State Legislative Assembly.

Public Notice and Hearing. One of the most controversial features in the application of these methods has been in the question as to what public notice and hearing should be provided when front-foot benefits are allocated. Inasmuch as the existing legislation provides that the front-foot assessments and the service charges shall be collected "by an action for debt or by a suit in equity to foreclose the lien," the Court of Appeals has determined that this provision in itself includes all the notice and hearing necessary to satisfy constitutional requirements. The taxpayer or property owner, therefore, presumably has no more right to be heard as to the amount of the assessment than he would have to be heard upon the question as to how much the annual tax levy for a local area should be. This decision is founded upon the fact that the Legislature itself has determined all the questions in these acts which may be described as judicial in character and has left to the Commissioners only the matters of fact and not of judgment. This view, plus the provision of a method by which the taxpayer is heard in court, has been the basis of the decision by the Court of Appeals.

It should be pointed out here, for clarity, that in most ordinances for paying for extensions by the front-foot assessment method, the assessment can only be made without notice or hearing when an opportunity for the taxpayer

to be heard in court is provided. In those instances where the tax constitutes a lien on the property collectible in the same manner as other taxes upon real estate, namely, by summary process and sale, public notice and hearing always must be provided.

Has the Property Been Benefited?—Everyone is familiar with the contention of the individual who, actually or supposedly, feels that his property has been benefited little or none and therefore an assessment is unjustified. This contention the courts have ordinarily dismissed as untenable. Cooley summarizes the principle briefly, as follows:

"It has been repeatedly decided that the legislative act of assigning districts for special taxation on the basis of benefits cannot be attacked on the ground of error in judgment regarding the special benefits, and defeated by satisfying a court that no special and peculiar benefits are received. If the legislation has fixed the district, and laid the tax for the reason that, in the opinion of the legislative body, such district is peculiarly benefited, its action must in general be deemed conclusive."

The United States Supreme Court, in Houck v. Little River Drainage District, stated: "When local improvements may be deemed to result in special benefits, a further classification may be made and special assessments imposed accordingly, but even in such case there is no requirement of the Federal Constitution that for every payment there must be an equal benefit." And, further, in *Miller and Lux V. Sacramento Drainage District*, "the doctrine has been definitely settled that in the absence of flagrant abuse or purely arbitrary action a state may establish drainage districts and tax lands therein for local improvements, and that none of such lands may escape liability solely because they will not receive direct benefits."

Summary

Certain general conclusions appear from this analysis of the municipal water-supply and sewerage costs in Maryland. They are presented here without further comment:

1. A wide variety of methods for financing municipal sanitary facilities is in use.

2. The origins of such variations lie in unexplained historical precedent, concessions to political expediency, efforts to meet the demands of the psychologies peculiar to the localities and, in a considerable number of instances, in the desire to supply an equitable and logical procedure.

3. Opportunities for profound changes in methods of finances are rare in any community where such utilities have been available for any considerable number of years. The obstacles are temporary inequalities which such changes may produce and the unfamiliarity and, hence the danger, of newly suggested procedures.

4. Regardless of the procedure in use, municipal costs for water-supply and sewerage are lower than the costs for practically any other commodity supplied to the consumer. One of the amazing features of this review is that it makes apparent the fact frequently stated that the consumer obtains modern water-supply and sewerage facilities at an annual cost less than what he would ordinarily expend for any other luxury or necessity.

5. Although this is the case, opportunities for inequality of distribution of these burdens are exemplified in the data presented in the body of this paper. The details of such inequalities have not been stressed, but they should be apparent to the careful reader.

ACKNOWLEDGMENTS.—The writer is indebted to his assistants, George L. Hall, Division Engineer, and J. R. McComas, Assistant Engineer, for the painstaking review and statistical calculations of the data shown in Table 1. He is particularly pleased to record the hearty cooperation of the municipal and sanitary district officials who furnished the material used to compile Table 1. This article is an abstract of a paper read before the New England Water Works Association.

Minnesota Highway Department Defines Good and Poor Roads

WHEN is a road "good"? Many people disagree, but the Minnesota Highway Department has prepared definitions of "good," "fair," and "poor" roads that ought to make it easier to classify the unpaved highways. The new definitions are probably the first attempt in any state to standardize the terms used in road-construction reports. It would be well if this general terminology were adopted through the country by towns, cities, counties, and states.

"Paved."—No further description is needed on the hard-surfaced roads, except in winter, when they may be "snow-blocked," or "rough."

"Good."—Any road where it is possible to travel at uniform high speed (35 miles per hour) with safety and reasonable comfort, in any standard make of car in good average condition.

"Fair."—Any road which is narrow, rough, muddy, sandy or having any other condition which makes it necessary to go slow, but possible to continue in high gear with any standard make of car in good average condition.

"Poor."—Any road where it is necessary for cars of any standard make to travel in second or low speed, on account of road surface. Steep grades, turns, crossings, etc., which make it necessary to go slow or shift, do not make a road "poor" if the condition is otherwise good.

"Impassable" is self-explanatory, except that a road where the majority of cars get through on their own power but an occasional car gets stuck, is listed as "poor" but not impassable.

Methods of Establishing Setback Lines

By Rollin L. McNitt

President, Board of City Planning Commissioners, Los Angeles

SO far the courts have been engrossed primarily with determining the constitutionality of this type of legislation, and but very few of the cases decided to date have discussed the details of methods used in establishing the proposed setback lines.

It is the province of the legislative body, either with the advice and recommendation of the planning commission, or upon its own initiative, to determine in the first instance whether the setback provision is reasonable and bears a substantial relation to the public health, safety, morals or general welfare. Before the courts can or will declare a setback line unconstitutional, it must be shown that there is no such relation, or that for some reason it is clearly arbitrary and unreasonable. The burden is upon the property owner who assails the setback provision upon the ground of its unconstitutionality, to show by clear and convincing proof that said line has no reasonable relation to the public health, safety, morals or general welfare, or that it is therefore unreasonable. In doing so, the evidence offered must be from witnesses assumed to be fully advised with respect to the subject of setback laws, and their relation to the public health and morals or public safety, and the testimony of the usual and ordinary witness, not claiming or having any special knowledge upon the subject of setback laws generally, will be excluded by the courts. (See Harris v. State [Ohio] 155 N.E. 166.)

The Law of Setbacks

is the title of the comprehensive paper presented at the Sacramento convention of the League of California Municipalities on September 21, 1927. The author is Dean of the Southwestern University Law School, in addition to serving, as indicated above, as President of the Board of City Planning Commissioners of that city.

The accompanying article comprises the latter part of Mr. McNitt's paper. The opening portion of the paper was devoted to a discussion of the legality of setback laws and ordinances, with citations from numerous court decisions, the most important of which are listed in the Editorial Note at the bottom of page 774.

Summarizing the present attitude of the courts as to the validity of statutes providing for building lines, Mr. McNitt says:

"Proponents of this type of legislation, as in the case of zoning, have persevered, and now we find a line of authorities, including the United States Supreme Court, upholding the constitutionality of this type of legislation under the exercise of the police power, and it may now be safely stated that municipal corporations have the authority, under the police power, to establish setback lines; provided they are reasonable under the circumstances, and that they have a reasonable or substantial relation to the public health, safety, morals or general welfare."

Period of Time

A setback line cannot be established for a limited period merely. This matter has already been determined by the courts in Curtis v. Boston (Mass.), 142 N.E. 95:

"In Curtis v. Boston . . . . , a proceeding to establish a building line was held to be invalid, as the scheme, as to part of the property, contemplated the establishment of a building line for the period of one year, instead of indefinitely. The question arose in a taxpayer's suit to enjoin payment from the treasury of the award made to abutters, under an order of street commissioners establishing building lines. The statute under which the Commissioners proceeded provides that a building line may be established in the manner prescribed for laying out highways, and the Court observed that its attention had not been called to any general statute or law for the laying out of highways for the period of a year. In reply to the contention that the Commissioners established several building lines, and the permanent line was within the statute, even if the temporary line was not, the Court said that the order of the Commissioners could not be divided; that it was not capable of a double construction which sustains the permanent taking and disregards the taking for a year; and, moreover, the valid and invalid parts were so mutually connected with, and dependent upon, each other as to warrant the conclusion that the board intended them as a whole, and that if all could not be given effect, the entire layout must fail." (44 A.L.R. 1378.)

Hearings and Notice

In the establishment of setback lines, hearings should be held either by the planning commission or by the legislative body, or both, so as to insure due process of law. Notification to all abutting property owners should be given, so that they may have an opportunity to be heard, for it has already been held that the ordinance establishing such a line, passed without notice, actual or constructive, to the owners of the land fronting on the street, is invalid for that reason. (See Bymes v. Riverton, 64 N. J. L. 210.)

How Far Consent of Property Owner Controls

While suggestions of the abutting property owners are entitled to great weight, and, as

heretofore stated, they must be notified before the line can be established, the establishment of setback lines cannot be delegated to the property owners themselves. This matter has long since been decided by the United States Supreme Court, in construing an ordinance of the city of Richmond, Va., wherein the ordinance provided:

"Whenever the owners of two-thirds of the property abutting on any street shall, in writing, request the committee on streets to establish a building line on the side of the square on which their property fronts, the said committee shall establish such line so that the same shall not be less than five feet nor more than thirty feet from the street line. . . . And no permit for the erection of any building upon such front of the square upon which such building line is so established shall be issued except for the construction of houses within the limits of such line."

In passing upon the ordinance the Court observed:

"It leaves no discretion in the committee on streets as to whether the street line shall or shall not be established in a given case. The action of the committee is determined by two-thirds of the property owners. In other words, part of the property owners fronting on the block determine the extent of use that other owners shall make of their lots, and against the restriction they are impotent. This we emphasize. One set of owners determine not only the extent of use, but the kind of use, which another set of owners may make of their property. In what way is the public safety, convenience, or welfare served by conferring such power? The statute and ordinance, while conferring the power on some property holders to virtually control and dispose of the property rights of others, creates no standard by which the power thus given is to be exercised; in other words, the property holders who desire and have the authority to establish the line may do so solely for their own interest, or even capriciously." (Eubank v. Richmond, 226 U. S. 137.)

It would seem, therefore, that while the wishes, desires and arguments, protests and representations of the property owners that may be affected by the adoption or modification of setback lines should be consulted and considered, in arriving at a proper conclusion by the legislative body enacting the legislation, the same are not conclusive upon the legislative body, and if it is attempted in the legislative body to make them so, that the legislation will be rendered invalid.

Establishment of Line by Reference to Existing Buildings

It is interesting to note the attitude of the courts where the setback ordinances have fixed the lines by taking the average distance from the street of the buildings in any given block, at the time of the passage of the act.

The Ohio Supreme Court has dealt with this matter in connection with an ordinance of the city of Warren. Said the Court:

"The next proposition is whether or not the setback line in the instant case is reasonable. The setback line of the ordinances in question and the line involved here were established by taking the average distance from the street of the buildings in any block at the time of the passage of the ordinance. The city of Warren and these buildings existed for a long time prior to the passage of the ordinance, and it would be exceedingly difficult to provide a specific setback line that would apply equally well to each particular block. The setback line on both sides of York Street, including the location in question, is 25 feet, and it is so fixed between Market Street and Ward Avenue. In the next block it is 22 feet, and so it varies all over the city of Warren, fixed with reference to the buildings already erected. Had it not been so, the person who might erect a new building and attempt to conform to a definite and fixed setback line, would perhaps have found himself in a pocket between two buildings which had been formerly constructed. And if such had been the provisions of this ordinance, there is little doubt that its terms would have been held to be unreasonable, and an unjust and an unwarranted interference with property rights.

But under the circumstances can a fairer method be suggested by which setback lines could be fixed and the rights of property holders determined in this respect than by taking the average distance of the buildings within the block from the street line to the street wall of the building, granting to each property owner fair consideration by striking an average line as indicated? If not, it cannot well be said that the line as fixed in the instant case is unreasonable, especially in view of the fact that this record does not disclose any testimony whatever to the effect that it is. The very fact that this average was adopted by the authorities of the city of Warren suggests to the ordinary mind the spirit of fairness that must have controlled in the attempt to provide a zoning ordinance for the city.

"Therefore it is sufficient to say that it could not well be maintained that this setback line in question is unreasonable, nor could this Court so find, in view of the fact that there is no testimony whatever disclosed by the record that it is unreasonable." (Harris v. State [Ohio] 155 N.E. 166.)

The Pennsylvania Supreme Court, however, in a case involving an ordinance of the city of Pittsburgh, substantially similar to the ordinance of the city of Warren, said:

"The application and consequence of this ordinance is a gross discrimination in that it does not bear alike on all persons living within the same territory. Regulations which do not operate on all alike cannot be justified under the police power. Here it affects property differently on adjoining blocks, or within the same block or on opposite sides of the street. As Judge Linn of the Superior Court states, 'The ordinance purports to zone the entire city—built-up as well as unbuilt. Section 32 (b) establishes a building line on streets wholly or partially built up. Consideration of the section will disclose that the line may be further back from the street line on one side of the street than on the other, and even on the same side of the street its distance from the street line may vary in different squares, its location depending wholly on how far back (if at all) a house or houses had already been built, and if but one house had been built, its line would seem to control all the other lot owners. If no house had been built, 32 (a) would seem to require all builders to recede at least fifteen feet.'

"We may add, if there is only one building erected in a block, placed back, say, 100 feet, from the street line, then all other buildings afterwards erected in the block, whether eighty per cent or more of the total number, would have to conform to this one. If the lots in a square were of different depths, the owners of the short lots might not be able to build at all on their lots, if they had to maintain the same distance back from the street as the eighty per cent of the buildings already erected on longer lots. No provision is made either for the difference in the character of the houses or their width or depth. They may all be of different sizes. It would be confiscatory to enforce such an ordinance. It applies only to one side of the street in blocks where eighty per cent of the houses are already set back a uniform distance." (White's Appeal [Pa.] 287 Pa. 260, at 268.)

The recent United States Supreme Court case, sustaining the validity of the city of Roanoke, Va., ordinance, involved the same question.* The ordinance was assailed not only on fundamental grounds, but upon the ground of vagueness and indefiniteness of the standard for determining the line. Mr. Justice Sutherland, upon this point said:

"It is said, first, that the standard furnished is so

* See THE AMERICAN CITY for December 1926, page 771, and January, 1927, page 125.

vague and uncertain as in reality to be no standard at all, since the houses, or 60 per cent of them, in any block, may stand at a variety of distances from the street, in which event it cannot be determined from the ordinance whether 60 per cent of the houses nearest to the street, or 60 per cent of those farthest from the street, or some other method of calculation, is to govern. But in the present case this contention may be put aside, since (a) the permit was granted and the building line fixed under the proviso which reserved to the council in appropriate cases authority to fix the building line without reference to this limitation; and (b) as to the existing houses in the block in question, the actual differences in respect of the building lines upon which more than 60 per cent of them stood are so slight as to be entirely negligible upon the question of certainty.

"The evidence shows that the variation in the location of 80 per cent of the existing houses was only one-tenth of a foot, and, ignoring this inconsequential difference, the established building line was slightly over 42 feet back from the street. The line designated for petitioner's building was substantially more favorable to him than this, being more than 7 feet nearer the street. Whether the provision of the ordinance, fixing the line with relation to the location of 60 per cent of the existing houses, in its general, or in some other specific, application is so vague as to amount to a denial of due process, is a question which does not concern petitioner, since, as applied to the facts in the present case, it is definite enough, and since, in any event, he has been excepted from the operation of the provision, and it does not appear that the alleged unconstitutional feature of which he complains has injured him or operated to deprive him of any right under the Federal Constitution. . . .

"The proviso, under which the council acted, also is attacked as violating the equal protection clause, on the ground that such proviso enables the council unfairly to discriminate between lot owners by fixing unequal distances from the street for the erection of buildings of the same character under like circumstances. We cannot, of course, construe the ordirance as meaning that the power may be thus exerted; nor may we assume in advance that it will be exercised by the council capriciously, arbitrarily, or with inequality. It will be time enough to complain when, if ever, the power shall be thus abused.

"The proviso evidently proceeds upon the consideration that an inflexible application of the ordinance may under some circumstances result in unnecessary hardship. In laying down a general rule, such as the one with which we are here concerned, the practical impossibility of anticipating in advance and providing in specific terms for every exceptional case which may arise, is apparent. And yet the inclusion of such cases may well result in great and needless hardship, entirely disproportionate to the good which will result from a literal enforcement of the general rule. Hence the wisdom and necessity here of reserving the authority to determine whether, in specific cases of need exceptions may be made without subverting the general purposes of the ordinance. We think it entirely plain that the reservation of authority in the present ordinance to deal in a special manner with such exceptional cases is unassailable upon constitutional grounds. . . .

"Yick Wo v. Hopkins, 118 U. S. 356, 6 S. Ct. 1064, 30 L. Ed. 220, upon which petitioner relies, is not to the contrary. The ordinance there involved vested uncontrolled discretion in the board of supervisors, and this discretion was actually exercised for the express purpose of depriving the petitioner in that case of a privilege that was extended to others. . . ." Gorieb v. Fox (Va.) 134 S. E. 914.)

Probably the doctrine of the Ohio case and the United States Supreme Court cases, however, rather than that of the Pennsylvania case, will continue to gain prominence, and we may, in view of these two decisions, be reasonably sure that ordinances following substantially the standard set forth by the city of Warren and the city of Roanoke will generally be sustained by our courts, and the attitude of the Pennsylvania court be discarded.

Comprehensive Plan

Just as zoning should follow a comprehensive scheme and be predicated upon a careful survey before its adoption, so, also, should the matter of establishment of setback lines receive careful consideration. Each street should be carefully studied from accurate plans, and from the situation on the ground, and, to avoid the criticism of vagueness and indefiniteness in the ordinance, it is a safe rule that each street should be judged on its merits, after consideration of every element involved.

The width, depth and shape of the lots abutting the street in question must be taken into consideration, because a setback line that would be entirely reasonable upon a certain type of lot might be arbitrary and unreasonable upon another. The building lines will vary from five to forty or more feet, depending upon the facts disclosed by the survey suggested. The narrower the street, however, the greater should be the established setback line.

Owing to the difference in construction and the difference in use between residential and business districts, it is quite reasonable to provide for more air space by the establishment of setback lines of greater depth in the residence than in the business districts. (See Pritz v. Messer [Ohio], 149 N.E. 30.)

The Los Angeles Board of City Planning Commissioners recently commenced a survey of this subject, in an endeavor to establish some rules and policies upon the same. While we have not come to a definite conclusion, we are of the opinion that setback regulations, to be valid, must always be consistent and, therefore, that under similar circumstances similar property should receive the same treatment. We feel that in arriving at definite policies, we must work out a formula involving at least these three factors:

(1) Type of use zone, "A," "B," or "C," etc.;
(2) Width of street; and
(3) Depth of lots.

We experimented with the method of declaring that on no street should buildings be erected closer than fifty feet from the center line. The theory seemed good, and may still prove sound, but practical difficulties arose: (1) What depth of lot could not afford such line and how could automatic exceptions be made? (2) What about the sides of lots at the ends of blocks, where property faced upon a cross-street? (3) What about similar cases where valuable business frontage, at the end of blocks, would have front footage sliced off? (4) What about corner lots in any case? (5) What about steep hillsides, where 26 feet is the maximum practical width of street and abutting lots are wide and shallow?

In the case of business streets and traffic thoroughfares, this method will apparently work well, except in two types of cases: (1) How shall we provide for the existing "non-

conforming" building? (2) How shall we provide for cases (which are numerous) where the "taking lines" for future widening do not follow the original center line? And yet, with all those difficulties, the method still holds promise. The answer will probably be found when we discover by actually applied tests in typical cases whether the red tape incident to adjustments is as great as, or greater than, the task of imposing lines street by street.

This brings us to a consideration of the individual street method, which is the method more usually followed, because heretofore the city of Los Angeles, as have most cities, largely awaited the initiative of the property owners, and the property owners have rarely initiated proceedings until a controversy arose in a particular block, due to someone's attempting to build out to the line on a vacant lot. Our experience in past proceedings, street by street, has demonstrated the futility of creating setbacks piecemeal, and enacting this legislation without reference to some definite standards.

We are therefore considering at this time a means to answer the question, "How much setback can be established, when and where and how?" by collecting valuable data that will reveal:

(1) What proportion of a lot can fairly be withheld from building area, as demonstrated by actual averages?

(2) What, if any, variance exists in the proportion of built-over land on varying depth lots?

(3) What general average is found to prevail among the characteristic uses, as classified in zoning? That is, what is the average "coverage" of single residences and is the average comprised of widely separated extremes? Or, what actual different types of development (in size) have we in the single classification of "B" zone, and can we discover that possibly an unwritten rule has grown up, that a certain type building seldom covers more than a given proportion of the site?

I cannot at this time suggest where these studies will ultimately lead to.

Setback Lines for Street Widening

With few exceptions, the main arteries between our existing residential districts and our business sections, in the larger cities at least, were mapped and acquired before the days of the motor vehicle. The result is that all of such arteries are proving inadequate to meet the modern conditions, resulting in serious congestion upon such main arteries.

A thoroughfare plan that will serve adequately the enormously increased needs of the future is a critical problem for most cities. After streets are built up solidly with business buildings and apartments, the expense of altering greatly the street plan is so great as to be almost prohibitive. Yet it is apparent that the limited number of through routes for traffic possessed by most cities will be absolutely inadequate for the needs of twenty to fifty years hence. Unless measures are taken in time, growth will be checked and cities may be faced with the alternative stagnation and permanent ruin or back-breaking financial burdens that could have been avoided by a little vision in street planning.

One of the greatest aids toward carrying out the widening of a street in a city is the establishment of new street lines, operative upon removal or replacement of existing buildings, thus making it possible for a city to utilize the passage of time and to accomplish the widening at the least cost and at no damage to the property owner, except the enforced surrender of the land at the jury award. Setback lines should also be established at intersections of important highways, far enough back from the present street lines so as to eliminate the obstruction to vision, and thus reducing the hazards incident to motor vehicle travel. This certainly is in the interest of public safety and, while there has been some suggestion in the cases that the establishment of setback lines solely with a view to future widening is an unreasonable burden upon the private property involved, this constitutional objection does not obtain in this latter instance. In the case of establishment of setbacks for future widening, attention is called to the fact that as early as 1854, and in a series of cases between that date and the present time, it has almost uniformly been held that a statute providing for a plan or map of a city to be made, locating streets and denying compensation for any building erected within the lines of a proposed street, after the filing of the map or the locating of the street, although the opening of the street is not at present contemplated, and may not take place for an indefinite time thereafter, is an unconstitutional exercise of the police power, as a taking of property without just compensation.* It is this line of authorities that would undoubtedly be utilized by opponents to the establishment of setback lines, predicated solely upon the ground of future street widening, without any other relationship to the elements of light, air, health, beauty, fire safety,

*Editorial Note.—A detailed discussion of alternative methods of providing for the reservation of locations of mapped streets for future public acquisition will be found under the heading, "Title III, Buildings in Mapped Streets," in the draft of A Standard City Planning Enabling Act, obtainable from the Advisory Committee on City Planning and Zoning of the U. S. Department of Commerce, Washington, D. C.

etc., bringing it within the scope of the proper exercise of the police power.

Summarization

In conclusion, an examination of the authorities to date convinces one that setback legislation is rapidly being sustained by the highest courts of the land, as one of the proper exercises of the police power, and that resort does not have to be made to the power of eminent domain; and that if such legislation is worked out by the legislative body, with a well-defined policy, after a comprehensive survey of the district to be affected, and after due notice and hearing, so as to avoid charges of discrimination, arbitrariness and unreasonableness, courts will not interfere and set aside the legislative enactments.

Such legislation, if carefully prepared by the various cities adopting it, will rapidly justify its existence, and with the growing respect therefor already evidenced by the courts, it will continue to grow and prosper with public opinion.

EDITORIAL NOTE.—As mentioned in the "box" on page 770 the author, in the opening portions of his paper, quoted numerous court decisions sustaining the validity of the establishment of setback lines. References to the most important of these decisions follow:

Connecticut Supreme Court, in Town of Windsor v. Whitney (95 Conn. 357, 111 Atl. 354, 12 A.L.R. 689).

United States District Court for the Northern District of Ohio, sustaining certain setback provisions of the building code of the city of Cleveland (Weiss v. Guion, 17 Fed. Rep., 2d Series, 202).

Court of Common Pleas of Akron, Ohio, sustaining the validity of setback line (Kaufmann v. City of Akron, decided Jan. 6, 1927, and reported in the *Daily Record*, Baltimore, March 25, 1927).

Supreme Court of Ohio in the case of Pritz v. Messer, 149 N.E. 30.

District Court of Appeals for the Second Appellate District, sustaining the validity of setback ordinance of the city of Los Angeles (Thille v. Board of Public Works, 52 Cal. App. Dec. 927).

Supreme Court of Ohio sustaining ordinance of city of Warren, creating setbacks as a part of a comprehensive zoning ordinance (Harris v. State, ex rel. Ball, 155 N.E. 166).

New York Court of Appeals, sustaining setback provisions of the Mt. Vernon zoning ordinance (Wulfsohn v. Burden, 241 N. Y. 288, 43 A. L. R. 651).

United States Supreme Court in the Roanoke, Va., case. See page 771 of this issue.

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Synchronous Motors for Pumps

By R. C. Allen

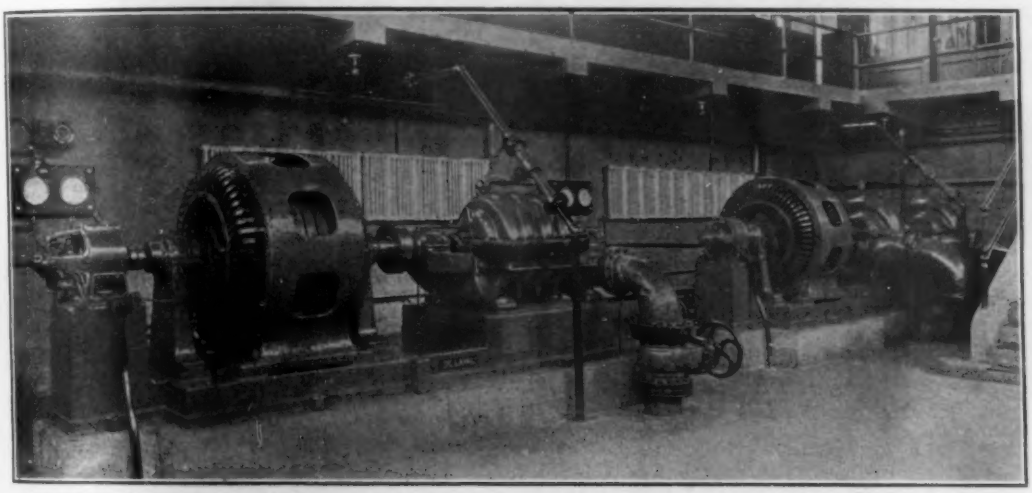
A COMPARISON of modern pumping-plants with those installed fifteen to twenty-five years ago shows a surprising contrast. There are economic reasons for this change and, though these reasons are different for the municipal or publicly owned plants and for the industrial or privately owned plants, the conclusions have been the same.

A survey of one of these old stations would show for the pump a high vertical 3-cylinder, slow-speed triple-expansion unit down in a pit about 20 feet deep, yet towering a story above the station floor. This arrangement is necessary where the station is pumping from a river, in order to keep the suction lift low. Where the pumping is from a reservoir, the pump is oiling the various equipment from the many floor levels, firing the boilers and handling the ashes, as well as cleaning the large station.

The over-all efficiency of these units—coal to water—is relatively high, so that the net cost per million gallons pumped, which includes all expenses with interest on the total cost of installation, is very reasonable as compared with that of the modern plant.

Changing Conditions

Then why the change, in the modern plant, to the small, high-speed, electrically driven centrifugal pump with power supplied from the central station? It is brought about by the changes in the conditions that governed the



TWO OF THREE WESTINGHOUSE 500-HORSEPOWER SYNCHRONOUS MOTORS DRIVING DE LAVAL CENTRIFUGAL PUMPS IN THE McKEESPORT, PA., WATER-WORKS

all above the floor, towering towards the roof. There are always two or three of these expensive units with sufficient total capacity to keep one as a spare, for, naturally, nothing must interfere with the continuous supply of water to the system.

Adjacent to this building is the boiler-house with its battery of—usually—hand-fired boilers and tall smokestack from which issues the tell-tale sign of industry—smoke. And, of course, around the boiler-house is the coalpile, with ample coal for everyday use and a surplus for an emergency.

Watching a station of this kind gives a feeling of majesty and power as the pumps slowly but steadily force the water into the arteries of the city's system. Men are busy everywhere, selection of this type of equipment twenty-five years ago.

Centrifugal pumps now have higher efficiencies, and the synchronous motors that drive them are also designed for high efficiencies and, incidentally, are simpler to operate than years ago. The central-station power is now not only cheaper than it used to be, but, because of the large central stations and tie-ins, is more reliable than the individual plant could possibly be.

True, there are other considerations, such as the cost of upkeep, requiring almost the complete replacement of wearing-parts of the reciprocating pump in thirty to forty years, while the centrifugal pump and its synchronous motor can hardly wear out, since there are few

wearing-parts. So, only an extremely small amount of wear can be expected in this pump as compared with the reciprocating unit, even though handling unfiltered river water.

The investment for the steam reciprocating unit and plant is prohibitive except for municipalities that can float bond issues at low interest rates. The high running expense, including a large number of men on the city payroll, tends to lead to political interference. These simpler and cheaper motor-driven units are therefore more attractive to the city engineer, who desires a pumping plant free from as many outside problems as possible.

The synchronous motor has played no small part in bringing about this situation. In fact, practically all the recent large pumping projects have been with synchronous motors running at high speed and direct-coupled to centrifugal pumps.

As over-all efficiency is of prime importance in the cost of operation when the unit is running continuously, day and night, synchronous motors for pumps have been especially designed for high efficiencies to match those secured on the present-day centrifugal pumps. This is obtained by the high grade of laminated iron, the large section of copper in the windings, and the low field loss, as well as the general balanced design. The motors have a 100 per cent pull-in torque (torque just before synchronizing), so that the pump valves do not have to be operated when starting—a great convenience when the unit has to be started frequently or the valves are large and cumbersome.

Synchronous motors and, in fact, all alternating-current motors, cannot efficiently vary their speed to secure the required varying output of water, as can the steam engine, but it is as feasible to install a larger number of relatively small units of the centrifugal type and vary the number operating. The expense of spare units is thus greatly reduced as compared to the cost of the steam plant.

Furthermore, units of different pressure systems and their spares can be had without any great additional investment. In small installations it is even possible to connect two motors of different speed and horsepower to the same pump and drive by the motor having the desired speed, the other running idle; or the idle motor can be disconnected entirely through its coupling.

Another factor influencing the selection of synchronous motor-driven pumps is the low power rate that can be offered by the central stations for the pumping load of this character, particularly a municipal pumping-station, since, with a synchronous motor, it is an ideal load having relatively steady 24-hour load that can, if desirable, be regulated to the off peak.

Induction or squirrel-cage motors are also used, but these have inherently a lagging power factor.

Contributing also to the popularity of the synchronous motor is the simple type of control which can be used with the present motor. An ordinary push-button with its automatic control will quickly and effectively start the motor without the necessity, as in former days, of using skill and care to synchronize it, that is, to get it into step with the incoming power line before closing the motor running switch. This was formerly accomplished by an auxiliary slip-ring motor of higher speed and on the same shaft, which would accelerate the motor up to or by the synchronous speed when the motor switch had to be closed at just the instant of synchronism. Of course, such a method of starting precluded any appreciable starting load, so a synchronous motor was used only for motor generator sets and, similarly, rotary converters and synchronous condensers.

The present design of synchronous motor has a squirrel-cage winding as part of the rotor, of similar construction to that used on the squirrel-cage motor and functioning in the same manner for starting and accelerating the load. The control can therefore be practically as simple as for the squirrel-cage motor, and in fact can be started in exactly the same manner if the automatic field switch is used for applying the field excitation. This ingenious switch is arranged so that it will close, to excite the field, automatically, at just the moment the motor reaches the proper speed to synchronize. A magnetic controller, operated by a push-button or other device, performs all of the starting functions automatically. Even starting by hand with a manual controller is so simple as to require practically no skill.

Financing

It is interesting to note that because municipal bonds can be floated on about 4 per cent interest, a city government can afford to pay about three times as much in first investment to secure high efficiency or lower operating costs than can an industrial concern, whose money invested is supposed to show 15 to 20 per cent returns. Despite this, and because of other factors, such as less money involved, quicker installation, smaller space required, and, especially, fewer men employed, the synchronous motor-driven pump, using central station power, is almost universally selected as being the most reliable and economical unit. In industrial plants there is seldom any question as to the use of synchronous motors for pumps of any large size.

Reclaiming Old Streets in Lake City

By C. W. Brown

Commissioner of Streets, Lake City, Fla.

LAKE CITY, in Columbia County, Fla., is the state's gateway for traffic going east, west and south, and Duval and Marion Streets are the main arteries for all traffic flowing in these directions. Duval Street takes all the traffic east to Jacksonville and west to Tallahassee, and beyond is known as State Road No. 1. Marion Street is State Road No. 2 and carries all traffic going south to lower Florida and north into Georgia.

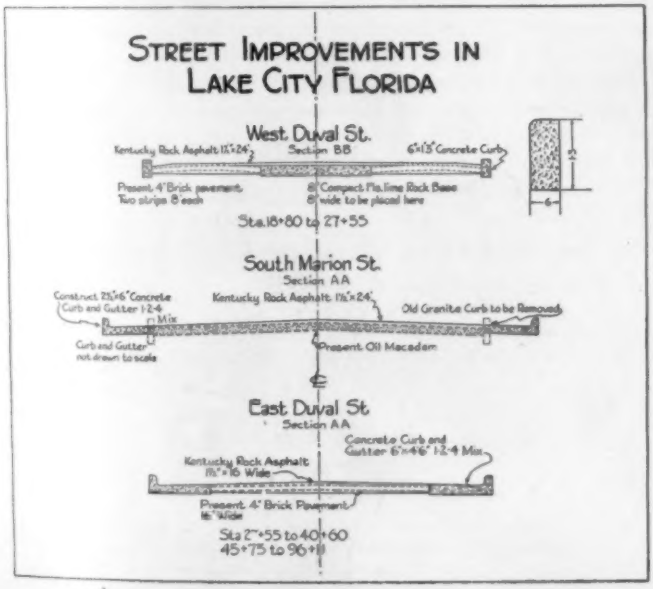
EAST DUVAL STREET, LAKE CITY, FLA., PAVED WITH ROCK ASPHALT

This street takes all traffic on State Highway No. 1, from Jacksonville west

Duval Street was originally constructed of brick. The entire eastern section, and also about 1,500 feet west of Marion Street, was 16 feet wide. This section was widened by building a 4½-foot concrete curb and gutter on either side. The gutter was finished ¼-inch below the grade and Kyrock rock asphalt wearing surface was placed over the old brick.

The rest of west Duval Street was originally constructed with an 8-foot parkway in the center, flanked by an 8-foot brick pavement on either side. The city school located at the starting point of the parkway demanded more pavement surface for parking and traffic. The necessary space was not available between the curbs and the boundary lines, so the parkway was converted into pavement.

The parkway was excavated to a depth of 8 inches, and 8 inches of Ocala lime rock was rolled into place, bringing the surface up to grade with the edges of the old brick pavement on either side. This surface was then given a primer coat of road oil, and the brick pavements on each side were painted with cut-back asphalt cement back to their crowns. Upon this surface was spread and rolled a mixture of Ocala lime rock and Kyrock, graduating the crown in the center and feathering out at the line of the original crown in the old brick pavement on each side.


STREET IMPROVEMENTS IN LAKE CITY FLORIDA
West Duval St.
Kentucky Rock Asphalt 11'x24'
Section BB
6"x15" Concrete Curb
Present 4" Brick pavement. Two strips 8 each
8" Compact Fla. lime Rock Base 8' wide to be placed here
Sta. 18+80 to 27+55
South Marion St.
Section AA
Construct 2½'x6" Concrete Curb and Gutter 1:2:4 Mix
Kentucky Rock Asphalt 11½'x24'
Old Granite Curb to be Removed
Curb and Gutter not drawn to scale
Present Oil Macadam
East Duval St.
Section AA
Concrete Curb and Gutter 6"x46" 1:2:4 Mix
Kentucky Rock Asphalt 11'-16 Wide
Present 4" Brick Pavement 16' Wide
Sta 2"+55 to 40+60
45+75 to 96+18

The old pavement was thoroughly inspected for breaks and loose brick, caused by traffic wear and water seepage. The larger holes were cleaned out, loose brick removed, and the holes filled with the lime rock tamped into place. Shallow depressions were paint-coated and brought up to grade with a mixture of the lime rock and rock asphalt tamped into place.

After repairs were completed, the rock asphalt was spread over the entire surface of the old brick street, raked to grade and rolled. This rock asphalt was laid cold just as it comes out of the car. It compacts about one-third under the roller. We laid the standard wearing surface 1½ inches thick compacted. This

THE INTERSECTION OF DUVAL AND MARION STREETS, SHOWING BEGINNING OF ROCK ASPHALT PAVEMENT AT LAMP-POST ON RIGHT

At this intersection traffic is almost continuous. Attention is called to the valley concrete gutters, which serve the double purpose of drainage and traffic lines

material does not require any time for curing, and traffic was routed over it immediately after rolling.

Resurfacing Old Macadam

Marion Street was originally constructed of penetration macadam. The old surface was very badly worn and could no longer be maintained at reasonable cost. The original construction was 24 feet wide with granite curbs. The old granite curbs were removed and the width extended with a 2½-foot concrete curb and gutter on each side. The gutter was finished ¼-inch below the new grade, determined for the rock asphalt surface on the old base. After the curbs and gutters were in, the street surface was cleaned and paint-coated with a cut-back asphalt cement. Following this, we spread and rolled a mixture of Ocala lime rock and rock asphalt to fill in the depressions and reshape the road. On this we spread the wearing surface of rock asphalt raked to grade and rolled, finishing in the standard thickness of 1½ inches compacted.

South Marion Street had a large number of giant live-oak trees 70 years old along the old curb line which we were compelled to sacrifice to make way for our white way and widening the pavement. All excavations caused by the removal of trees were filled with Ocala lime and rock, brought to grade and thoroughly waterbound before surfacing.

The Interstate Construction Co., Sanford, Fla., were the contractors. Full credit for the plan of this improvement is due C. E. Swank and L. S. Mitchell, former City Manager and City Engineer, respectively, as the plan was developed under their supervision. The details were carried out by the present administration. It is thought that under no other arrangement could the city have secured at comparative costs the equal of these two high-class modern pavements.

To Exchange Ideas on Administrative Practice of Civic and Social Agencies

A COOPERATIVE Committee on the Administration of Civic and Social Agencies has been organized by Elwood Street, Director of the Community Council and Community Fund of St. Louis, 2221 Locust Street, St. Louis, Mo. The committee is made up of the executives of social and civic organizations throughout the country, including community chests, individual social agencies, chambers of commerce, city clubs and public welfare officials. A questionnaire is sent to each member of the committee each month with questions regarding the practice and opinion of the committee member in handling various administrative problems such as committee management, office administration, office arrangement, employment problems, development and maintenance of staff morale, publicity, financial organizations, etc. A bulletin will be sent to members of the committee each month, summarizing the answers and enclosing the questionnaire for the next month.

Any person with executive experience who is willing to contribute his thought and experience is welcome to become a member of the committee. No dues are charged at the present time. Membership is open only to those who will cooperate actively in the answering of the questionnaire.

Graft: Necessary Concomitant of Civic Progress and Improvement?

BOSSISM in municipal politics, if it did not, as some sociologists have alleged, originate in America, has certainly reached its most advanced stages here. The *evil* of graft is a commonplace in the histories of our cities. But *graft as a civic benefaction* is an idea strikingly and not unconvincingly depicted by no less dignified a person of opinion than Don C. Seitz.

In an article, "Do We Need Grafters?" in the October number (which is the first general circulation number) of a new journal of opinion, *Plain Talk*, boodle is defined as a sort of commission paid by the American public for public works. Mr. Seitz raises the question of whether we can have progress and great works without graft and points to the great city, beautiful and politically corrupt—and, in contrast, the small town, honest, parsimonious and ugly.

Can We Have the Human Touch Without the Itching Palm?

It can hardly be necessary for The American City to assure its readers that no endorsement of graft as a method of city building is to be inferred from Mr. Seitz's striking contrast of the benefits conferred on American cities by the grafting boss and the "conservative citizen." But we do believe that the so-called better element in most communities have much to learn from those whom they rightfully despise.

A philosopher once said that he was frightened much less by the uprising of the radicals than by the downsitting of the conservatives. He might have added that mere honesty will not build a city, and that "good government is never really good which has not learned how to apply the human touch—without the itching palm."

Boss Tweed, for instance, looms large in New York City history as the man who took control of Tammany Hall at the end of the Civil War and the beginning of an era of great prosperity, and speedily caused the city's debt to leap to $130,000,000. He lined his pockets and the pockets of fellow-conspirators with nobody knows how much graft. He served a year's sentence on "The Island," and died in Ludlow Jail. Yes, but listen to Mr. Seitz reminding us that:

"The New York of that time was a squalid, ill-made town, a dumping-ground for immigrants and a breeding-place for poverty and crime. It had nests of poverty and crime that would shock even a Times Square theatrical manager. The tenements were dirty and dark. The streets, if paved at all, were rough with cobbles, save the Broadway of the merchant princes and the Fifth Avenue of the Conservative Citizen."

New York needed pavements and Boss Tweed paved it. It needed Central Park; he built it. It needed boulevards through the rocky ridges of Harlem; he laid them out wide and beautiful. He seized the waterfront and made Riverside Drive possible. He built a new court-house. "The man had great vision and an eye for beauty."

"He stole, and stole prodigiously. But his enterprise with all the grafting gave New York its modern start and opened the way for its magnificent expansion. No Conservative Citizen lifted his hand to help the new order. They never do. Squalid New York ceased to be after the Tweed era and Greater New York came into its own."

And what, pray, Mr. Seitz asks, is a mere hundred and thirty million of debt in exchange for such service?

Then came Boss A. R. Shepard in the U. S. Grant administration to pull our national capital out of a mudhole and set it on solid ground, where Major L'Enfant's magnificent plans, long drawn, began to materialize into George Washington's dream of a capital city. To-day, Washington is the most beautiful city in America, one of the most beautiful cities in the world, because, like Boss Tweed, Boss Shepard was a "grafter with vision" and gave it the necessary impetus. There were other grafters in other cities; but all of this has to do with large centers. Mr. Seitz states the case of the small town:

'I knew a Down East state that then had no health laws. The commonwealth had lumbered along for almost a century without sanitation. The Conservative Citizen wouldn't have it. In a town where I once sojourned, consumption was endemic. Twenty-six young women died from it. The young men got away as a rule. Health laws were passed by the state. A young local physician was made health officer in this town. Besides consumption, it enjoyed yearly epidemics of scarlet fever, measles and smallpox. It had no sewerage, no water-supply. Typhoid often came to aid consumption.

"The Conservative Citizens defied the young doctor. He was a native and not a quack, so he decided not to defy them but to let them die in

their own way. But along came a man with an idea that a water company would pay. He tried to raise $45,000 to secure a supply from a handy pond. The community subscribed just one-ninth of it and the project was about to fall through, though there was a full million on deposit in the local banks. Along came a pump man who showed the promoters how to succeed. He took $45,000 in bonds and built the plant. The promoters issued $45,000 more to the subscribers of $5,000 and all went well. A gravity service could have been secured for the same sum the pumping outfit cost, but nobody would take its bonds. So the town for a generation has been paying for needless pumping, plus $40,000 of watered stock, but tuberculosis, typhoid and the epidemics have disappeared. The water-supply brought sewerage and, with it, sanitation. The town has paid high for the benefits. It would not take up a bargain in its own interest. . . .

"In matters of private concern the Grafter seldom gets anywhere. The public forms his prey, and, it must be said, deservedly. Franchises worth billions have been thrown away, because few Americans will do anything for each other in a common way. Their attitude makes the Grafter a necessity if the country is to progress. . . .

"It is easy to call all this a shameful story," says Mr. Seitz, in conclusion; "it is. But there is no need to reproach the Grafter. Honest men have always had the first chance to aid inventors and to make fair use of franchises. They will not do it. The Adventurer must show the way, or the community will do without. Who would be Spartan enough to do away with railroads, electric lights, water-supply, sewerage, pavements, telephones, gas, *et al.*, because they were promoted in dishonesty and perfected in sin? We need not glorify the Grafter, but he is bound to exist until the world develops its greatest need—a patent new kind of man!"

A New York Project to Multiply Play Space

THE upward-thinking architecture of New York has expressed a new mood. According to present plans of a group of citizens, locally and nationally prominent, the city will before long be by way of achieving a remarkable public building. It will shoulder aloft, not to steal sunshine and air from the poor, as the skyscraper has been charged with doing, but to recapture these and give them back, manyfold, to dwellers in one of the congested tenement sections.

The Indoor-Outdoor Playground, as the structure will be called, was first conceived by Charles Downing Lay, who sought the collaboration of an eminent architect, the late Bertram Grosvenor Goodhue, in its design. Himself a landscape architect, Mr. Lay had long been aware of New York's acute land problems, which are the problems of the child playing in congested streets at the hazard of life and limb, and of the adult playing nowhere at all at the hazard of health and sanity. The proposed structure consists of six levels with a basement and a subbasement, and is designed to be built on a block front, facing southward, the lot being 20 feet wide and at least 200 feet deep.

The basement level provides for three swimming pools, for adults, boys and girls. The street level will have shops facing on the street, and a large dance hall, which may also be used for other purposes. The first level will have a covered terrace fifty feet wide extending around the building. On this will be seats, swings, seesaws and other playing equipment. This is designed for small children and for mothers with infants, being but one stage above the ground, and easily accessible to mothers with perambulators or with infants in arms, by the ramp, or sloping walk, which is the means of communication between all floors. This level is the auditorium floor. The auditorium will have a seating capacity of 850 persons and will be equipped for motion pictures, concerts and lectures, amateur drama and similar entertainment. It has also four committee-rooms, dressing-rooms, etc. The second level will be taken up by the upper part of the auditorium and a terrace, which is half-enclosed for rendering it useful in all weather. This level is planned for playing-equipment, including revolving platforms, slides, pipe jungles, and swings, and a seating capacity of 690 persons on the terrace. Above is another playing-level, which in addition to equipment of all sorts, including a small moving picture projection booth, has four wading pools for young children. The top level contains a basketball court, a handball court, and seating arrangements for spectators.

Mr. Lay recommends that the building should be located across the street from a playground for the obvious reason that each would take away from the other crowds not actively participating in the activities offered. Boys wanting to play baseball would go to the playground diamond, while mothers with small children would seek seats on the sunny terraces. The site committee now actively working on the plan, however, may or may not choose a site affording this advantage. They consider it essential to the success of the plan that the

THE PROPOSED INDOOR-OUTDOOR PLAYGROUND AS VISUALIZED BY CHARLES DOWNING LAY AND DESIGNED BY HIM WITH THE COOPERATION OF THE LATE BERTRAM GROSVENOR GOODHUE

land chosen face southward. It is also announced that the structure will be located in one of the city's most congested centers where land will be made available by the demolition of existing buildings.

The building will not be under control of the public recreation system. In keeping with Mr. Lay's original idea that the Indoor-Outdoor Playground should be operated as a foundation, a corporation is being formed which, under the laws of New York State, will permit (1) the collection of the two million dollars necessary for the building, and (2) operation on a self-supporting but non-commercial basis. After extensive studies into social center administration, Mr. Lay worked out complete estimates covering equipment and maintenance, as well as construction. The figure set for the total annual cost of operation is $370,420, while the offsetting sum to be realized from rental of stores, halls, club rooms, and other space, and patronage of recreation facilities, he estimates at $337,525.

George McAneny, former Chairman of the Transit Commission of New York City, and President of the National Civil Service Reform League, is Chairman of the Indoor-Outdoor Playground Association. George Gordon Battle heads the committee on finance, and other locally and nationally prominent persons actively supporting the proposed enterprise are: Henry H. Curran, lately Commissioner of Immigration on Ellis Island, and now Counsel of the City Club of New York; Hatcher Hughes, playwright and instructor at Columbia University; Joseph P. Chamberlin, Professor of Public Law at Columbia University; Daniel L. Turner, Consulting Engineer of the New York Public Transit Commissions; Dr. Haven Emerson, health authority; Colonel William John Wilgus, architect of the New York Central Terminal, and Dr. William J. O'Shea, Superintendent of Schools.

Mr. Lay believes that the proposed building will succeed or fail according to the cost of furnishing free recreation—a cost to be determined after all profits on rentals, concessions, sales, or uses of facilities for which a fee is charged, have been deducted. But the ultimate workability of the plan, after financing has been provided for, will rest rather with the administration personnel and the ability of those in charge to steer a happy middle course between commercialized entertainment on the one hand and paternalistic benevolence on the other. Playing-streets have proved ineffectual in New York, as playing-piers have proved dangerous and inadvisable; and should recreation, forsaking land and water, take this first flight into the air successfully, it is not difficult to see that the enterprise will be followed by others of the same sort until there will be an Indoor-Outdoor Playground for every ten blocks throughout the city's congested parts. Or, according to Mr. Lay's original conception, "as many of them as there are settlements, which are located on the basis of one every quarter-mile."

Putting Recreational Facilities on a Self-Supporting Basis

By Edward D. Greenman

Assistant Director, New York State Bureau of Municipal Information

WITH municipal expenditures rapidly increasing, city officials are becoming increasingly watchful for new sources of revenue. Some cities secure substantial sums through the licensing of outdoor sports and amusements and through the granting of refectory concessions, while a great many cities totally neglect this source of income. The experiences of other cities in charging a fee for outdoor activities may offer some suggestions to those cities neglecting this source of revenue. Small as it may be, in many cases, it can be made to put certain activities at least on a self-supporting or practically self-supporting basis. This is especially true in the case of park recreational facilities such as golf, tennis and boating. Recreational facilities for the poor should, of course, be furnished without cost, but in the case of golf, tennis, etc., which require costly equipment, the persons indulging in these sports are well able and willing to pay a reasonable fee.

The following charges for recreational facilities and refectory concessions were compiled from a recent report on this subject prepared by the New York State Bureau of Municipal Information. This information was secured as a result of a questionnaire sent out by this Bureau to the 350 largest cities in the United States.

Golf

Where municipal golf courses are provided, it is quite customary to charge a fee. This varies widely in different cities, ranging from 10c a game to $100 a month. The following table shows the charges for golfing made by certain cities:

Bridgeport, Conn.	25c a day
Buffalo, N. Y.	$25 a year; 50c a round
Colorado Springs, Colo.	$20 a year; non-residents, $45 a year
Columbus, Ohio	50c a day
Dallas, Texas	$10 and $20 a year
Davenport, Iowa	30c for 18 holes
Dayton, Ohio	$10 a year
Denver, Colo.	$12.50 a year; 50c a round
Des Moines, Iowa	$5 a season; 50c a day
Detroit, Mich.	9 holes 25c; 18 holes $1
Erie, Pa.	50c daily; 75c Sunday
Flint, Mich.	25c for 9 holes
Grand Rapids, Mich.	15c for 9 holes
Hartford, Conn.	10c for 9 holes
Houston, Texas	35c-50c a round
Jackson, Mich.	25c for 9 holes; 50c for 18 holes
Lincoln, Nebr.	50c a round
Long Beach, Calif.	$100 a month; $5 a day
Los Angeles, Calif.	$1 a day
Louisville, Ky.	$5 a year; 25c a day
Miami, Fla.	$60 a year; $1.50 a day
Milwaukee, Wis.	15c a round
Minneapolis, Minn.	40c-75c a round
Muskogee, Okla.	50c per game
Oakland, Calif.	$30 a year; 75c a game
Pittsburgh, Pa.	$3 a season
Pontiac, Mich.	30c a round
Portland, Ore.	30c for 9 holes
Racine, Wis.	15c a round
Rochester, N. Y.	$5 per season; 50c a day
San Diego, Calif.	$12 a year; $7.50 for 6 months; $2 a month; 50c a day
San Francisco, Calif.	50c to $1 a round
Spokane, Wis.	$20 a year
Washington, D. C.	For a season ticket which allows unlimited play week-days and one round Saturday afternoon, Sundays and holidays, $20; a monthly ticket which allows ten rounds of 18 holes week-days or 9 holes Saturday afternoon, Sunday and holidays, $2; one round or 9 holes week-ends, 15c; one round of 9 holes Saturday afternoons, Sunday and holidays, 25c; one round 18 holes week-days, 25c. All tickets include the use of lockers, shower - baths, and other facilities.
Wilmington, Del.	50c a round
Worcester, Mass.	$10 a season; $1 a day

Tennis

In the case of tennis courts it is more customary to provide these without charge. However, many cities do make a charge because of the supervisory service required and in order to prevent monopoly by individuals. Some fees charged are:

Buffalo, N. Y.	10c an hour
Colorado Springs, Colo.	$8 a year
Flint, Mich.	$2 a year
Hartford, Conn.	10c an hour
Rochester, N. Y.	50c a year for button permit usable for all courts
San Diego, Calif.	$12 a year; $7.50 for 6 months; $2 a month, and 50c a day
Wheeling, W. Va.	5c a half-hour

Swimming

For the use of municipal swimming pools and bath-houses, most cities charge a small fee for suits, towels and lockers and also have certain days on which a fee is charged for bathing. Frequently a municipality will provide free bathing for children but make a charge for adults. The following charges for swimming usually cover towels and lockers:

Beaumont, Texas	10c
Birmingham, Ala.	10c
Bridgeport, Conn.	10c
Dallas, Texas	25c
Dayton, Ohio	25c
Des Moines, Iowa	10c, suits 15c, towels 5c
Detroit, Mich.	15c
East St. Louis, Ill.	10c-25c
Flint, Mich.	10c for adults
Ithaca, N. Y.	25c for suit
Johnstown, Pa.	20c, children 10c
Louisville, Ky.	15c
Lowell, Mass.	10c for suits
New Britain, Conn.	5c
Pasadena, Calif.	15c-40c
Pontiac, Mich.	5c-10c

Boating

Owing to the cost and expense of upkeep of boats and canoes, a charge for their use on municipal lakes, rivers, etc., is customary.

Dayton, Ohio.....25c an hour
Detroit, Mich.....20c an hour
East St. Louis, Ill.....25c an hour; private canoes, $5 a year
Elizabeth, N. J.....50c first hour, 25c thereafter an hour
Milwaukee, Wis.....10c for half-hour
Minneapolis, Minn.....25c an hour
Pawtucket, R. I.....25c an hour
Providence, R. I.....35c an hour
Salem, Mass.....35c an hour
Sioux City, Iowa..... 25c an hour

Among the other recreational activities for which fees are charged are the use of municipal dance halls, camping sites, use of toboggan slide, rental of lockers for athletic fields, and in a few cities for baseball and football games and other athletic events.

Concessions

A more universal and justifiable charge in connection with recreational facilities is the fee charged for concessions. These include lunch rooms, confectionery stands, soft-drink dispensaries, boat liveries, etc., operated by private persons in public parks and recreational centers. Some municipalities operate these officially. In many other cases the fees for such concessions amount to a considerable sum. In New York City the boating and skating concessions bring in fees of $16,000 a year. The dancing concession in Buffalo's city parks nets $2,000 a year.

Six cities—Green Bay, Wis.; Hartford, Conn.; Waterbury, Conn.; Minneapolis, Minn.; Milwaukee, Wis.; and Grand Rapids, Mich.—report that these concessions are operated by the municipality. This is usually done under the park department and all moneys secured are credited to the park fund.

Some of the charges made for concessions operated by private individuals in municipal parks are:

Bethlehem, Pa.—Concessions at parks are given out by bids. Highest bidder gets the concessions. Usually given for a period of three years. This covers refreshment stands only. Everything else is distributed free to public.

Buffalo, N.Y.—Privilege of selling soft drinks, sandwiches, candy, etc., in all parks except one, $17,500 for five years; in the exception, $11,000 for five years; in ferry terminal, $600 for one year; balloons in all parks, $300 for one year; in Grover Cleveland Park, $600 for one year; caddy houses, $200 and $937.50 for one year; boating and skating, $300 for one year.

Cambridge, Mass.—$250 for a holiday to anyone wishing to hire field for all sports; $150 for one half-holiday or Saturday all day; $100, Saturday afternoon; $75, Saturday afternoon game, if contestants are Cambridge residents.

Cedar Rapids, Iowa.—Let to highest bidder; $400 for one year.

Dallas, Texas.—Cold-drink concessions, $8,713.29 for one year; golf concessions, $2,675.62.

East St. Louis, Ill.—Concessions in two parks, $800 for one, $300 for other for one year.

Elmira, N. Y.—Hot dogs, $300; popcorn, $150; ice cream, $325; doll-rack and souvenirs, $100; merry-go-round, $300; tintypes and photos, $10; waffles, $50; root beer, roller coaster, dance hall, etc., $900. All prices are for the summer season.

Elizabeth, N. J.—Practically all concessions run by Park Commission. Concessions given to other individuals on basis of 10 per cent of gross receipts. Contract on this basis may be terminated at any time.

Erie, Pa.—$1,050 for refreshment concession.

Fort Wayne, Ind.—Swimming pool concessions $400 per year; pleasure park, $3,000 a year for 10-year contract.

Ithaca, N. Y.—Lakeside Park, sandwiches, peanuts, popcorn, candy, pop, etc., $400 for season. For the same concessions on city ball park, $5,150 for season.

Jackson, Mich.—Operating concession, 15 per cent of sales for year.

Johnstown, Pa.—Swimming pool concession (candy and soda water, etc.), $75 for year; Point Stadium concession (candy and soda water, etc.), 20 per cent of gross for one-year periods.

Kingston, N. Y.—No concessions in parks, except an association or Sunday School holding a picnic, which has the privilege of selling ice cream, candy, etc., for which there is no charge.

Lexington, Ky.—Municipal auditorium for various entertainments is let and the cost is only for light, heat, janitor and fireman services.

Little Falls, N. Y.—On city playgrounds a charge per day of $50 is made for circuses and $25 per day for carnivals.

Milwaukee, Wis.—Park board operates its own concession stands in all parks. Money taken in on above activities for which there is a charge is also credited to the park fund.

New Britain, Conn.—Concessions according to park, $500, $250, and $150 for one year.

New York City, Borough of Manhattan.—News-stand fees vary, also fees for refreshment stands; boating and skating, $16,000 for 10 years; carousel, $1,825 per year for 5 years; restaurant, Riverside Park, $5,000 a year for 10 years; restaurant, Central Park, $5,000 a year for 10 years; candy stands, Central Park, various fees for various lengths of time.

Norristown, Pa.—Refreshment stand, $250; leased for two years.

Paterson, N. J.—Refreshments in the various parks for one year, $55, $25, $75, and $50. Merry-go-round, $25 for one year.

Perth Amboy, N. J.—House with candy and ice cream, $20 for month.

Pittsburgh, Pa.—Lake concession, $50 and $125 per month for 12 months. For refreshment privilege the prices are $50 a month for 6 months; $41.67 a month for 12 months, and $10 a month for 12 months. These prices show the lowest and highest rates. For the seven or eight refreshment privileges, prices range in between those above.

Richmond, Va.—Boating privilege, $132 a season; selling refreshments, $165; selling refreshments at lake, $1,050.

Rochester, N. Y.—Refectories in various parks, $1,500 to $5,000 a year for one to three years; golf, $350 to $1,000 in various parks for one year; merry-go-round in various parks, $300, $700 and $1,300 for one year; boating privilege, $1,000 for three years.

Rockford.—Park concessions, $1,800; contract for season.

Salem, Mass.—Flying-horses, $100 for summer season; shore dinner restaurants, $50 to $300, according to size of building for summer season.

Scranton, Pa.—Refreshment concession, $150 for 12 months.

Sioux City, Iowa.—Refreshments, 20 per cent of profits for one year.

Toledo, Ohio.—Catering and refreshments, $2,700 for one season.

Utica, N. Y.—Skating privileges rented, $50 per month. Tennis club-house, $50 for six months.

Watertown, N. Y.—Park privilege, $300 for one year with usual stand.

Yonkers, N. Y.—Concessions for sale of candy and soft drinks about $250 a year.

Costs of City Government, Net Debt, Per Capita Valuations and Levies: 1926

From the Forthcoming Report of the Bureau of the Census, U. S. Department of Commerce, on "Financial Statistics of Cities Having a Population of Over 30,000 : 1926"

	Group I Cities of 500,000 and Over	Governmental-Cost Payments for Expenses of Municipal Departments: 1926						
		All General Departments	General Government	Protection to Person and Property	Conservation of Health	Sanitation	Highways	Charities, Hospitals, and Corrections
1	New York, N. Y.	$313,829,106	$32,837,673	$61,384,253	$5,183,536	$28,861,588	$25,806,050	$19,065,029
	Per capita	52.98	5.54	10.35	0.88	4.87	4.37	3.37
	Per cent of total		10.5	19.5	1.7	9.2	8.2	6.4
2	Chicago, Ill.	128,506,390	14,338,447	23,960,076	3,933,724	13,144,389	10,997,893	5,776,830
	Per capita	42.16	4.70	7.85	1.29	4.31	3.61	1.90
	Per cent of total		11.2	18.6	3.1	10.2	8.6	4.5
3	Philadelphia, Pa.	80,406,497	8,675,566	16,249,682	1,183,774	7,186,927	5,133,936	6,299,617
	Per capita	40.04	4.32	8.10	0.59	3.58	2.56	3.14
	Per cent of total		10.8	20.2	1.5	8.9	6.4	7.8
4	Detroit, Mich.	56,295,952	4,175,731	12,243,897	1,979,330	4,323,968	6,607,807	4,299,738
	Per capita	44.40	3.29	9.66	1.56	3.41	5.21	3.39
	Per cent of total		7.4	21.8	3.5	7.7	11.7	7.6
5	Cleveland, Ohio.	38,081,601	3,559,535	6,364,538	1,598,761	2,810,256	3,669,777	1,610,034
	Per capita	39.67	3.71	6.63	1.67	2.93	3.82	1.68
	Per cent of total		9.3	16.7	4.2	7.4	9.6	4.2
6	St. Louis, Mo.	29,293,530	2,590,550	7,572,430	779,689	1,336,111	2,585,903	2,714,793
	Per capita	35.55	3.14	9.19	0.95	1.62	3.14	3.29
	Per cent of total		8.8	25.9	2.7	4.6	8.8	9.3
7	Baltimore, Md.	26,663,215	1,949,529	6,533,280	692,325	2,288,890	3,208,246	1,566,566
	Per capita	33.00	2.41	8.09	0.86	2.83	3.97	1.94
	Per cent of total		7.3	24.4	2.6	8.6	12.0	5.9
8	Boston, Mass.	47,884,339	4,084,708	9,341,370	1,207,077	3,989,645	3,894,797	4,541,073
	Per capita	60.84	5.20	11.87	1.53	5.07	4.95	5.77
	Per cent of total		8.5	19.5	2.5	8.3	8.2	9.5
9	Los Angeles, Calif.	54,655,614	4,815,513	10,404,247	1,498,569	1,826,603	5,490,741	3,640,618
	Per capita	[1]	[1]	[1]	[1]	[1]	[1]	[1]
	Per cent of total	8.0	8.8	19.0	2.7	3.3	10.1	6.7
10	Pittsburgh, Pa.	32,220,124	3,924,241	5,304,879	683,209	2,952,065	4,232,758	2,174,183
	Per capita	50.58	6.16	8.33	1.07	4.63	6.65	3.41
	Per cent of total		12.2	16.6	2.1	9.2	13.1	6.7
11	San Francisco, Calif.	24,568,522	2,368,106	6,936,843	379,178	871,491	1,310,984	2,720,614
	Per capita	43.72	4.21	12.34	0.67	1.55	2.33	4.84
	Per cent of total		9.6	28.2	1.5	3.5	5.3	11.1
12	Buffalo, N. Y.	30,026,304	2,258,259	5,254,866	943,090	2,253,376	3,459,490	2,823,622
	Per capita	55.50	4.17	9.72	1.74	4.17	6.39	5.22
	Per cent of total		7.5	17.5	3.1	7.5	11.5	9.4
13	Washington, D. C.	25,100,274	1,235,306	5,386,376	359,852	1,794,122	2,315,153	2,967,950
	Per capita	48.18	2.37	10.34	0.69	3.44	6.36	5.70
	Per cent of total		4.9	21.4	1.4	7.1	13.2	11.8
14	Milwaukee, Wis.	23,217,506	2,036,472	3,997,044	704,893	2,023,070	2,446,341	1,972,783
	Per capita	44.91	3.94	7.73	1.36	3.91	4.73	3.82
	Per cent of total		8.8	17.3	3.0	8.7	10.5	8.5
	Group II Cities of 300,000 to 500,000							
15	Newark, N. J.	24,732,531	2,003,172	5,372,777	960,857	2,066,857	1,572,889	2,595,778
	Per capita	53.88	4.36	11.70	2.09	4.50	3.43	5.66
	Per cent of total		8.1	21.7	3.9	8.4	6.4	10.5
16	Minneapolis, Minn.	17,284,364	1,387,861	2,688,830	1,004,316	707,114	1,802,451	854,550
	Per capita	39.83	3.20	6.20	2.31	1.63	4.15	1.97
	Per cent of total		8.0	15.6	5.8	4.1	10.4	4.9
17	New Orleans, La.	11,235,945	1,348,895	2,863,779	243,781	1,222,913	1,150,933	310,848
	Per capita	26.82	3.22	6.84	0.58	2.92	2.75	0.74
	Per cent of total		12.0	25.5	2.2	10.9	10.2	2.8
18	Cincinnati, Ohio.	17,552,581	1,958,282	2,681,655	410,994	795,948	2,043,830	1,316,592
	Per capita	42.71	4.76	6.53	1.00	1.94	4.98	3.20
	Per cent of total		11.2	15.2	2.3	4.5	11.7	7.5
19	Kansas City, Mo.	14,946,400	2,092,381	2,336,350	226,199	583,796	1,882,524	1,535,352
	Per capita	40.40	5.66	6.31	0.61	1.58	5.09	4.15
	Per cent of total		14.0	15.7	1.5	3.9	12.6	10.3
20	Seattle, Wash.	14,148,982	1,713,556	3,151,063	425,175	1,013,884	1,551,692	853,071
	Per capita	[1]	[1]	[1]	[1]	[1]	[1]	[1]
	Per cent of total		12.1	22.3	3.0	7.2	10.9	6.0
21	Indianapolis, Ind.	12,516,436	976,403	2,889,716	387,788	655,770	845,879	805,610
	Per capita	34.10	2.66	7.87	1.06	1.79	2.31	2.20
	Per cent of total		7.8	23.1	3.1	5.2	6.8	6.4
22	Rochester, N. Y.	16,877,272	1,569,459	2,768,232	581,152	1,693,916	1,284,634	851,458
	Per capita	52.58	4.89	8.63	1.81	5.28	4.00	2.65
	Per cent of total		9.3	16.4	3.4	10.0	7.6	5.0
23	Jersey City, N. J.	17,390,393	1,945,855	4,769,044	681,647	1,053,578	1,072,566	1,878,876
	Per capita	54.69	6.12	15.00	2.14	3.31	3.37	5.91
	Per cent of total		11.2	27.5	3.9	6.1	6.2	10.8
24	Louisville, Ky.	8,159,931	616,482	1,545,382	411,828	452,199	1,010,702	690,953
	Per capita	26.49	2.00	5.01	1.34	1.47	3.29	2.17
	Per cent of total		7.6	18.9	5.0	5.5	12.3	8.2

For notes, see end of table. Numbers at left of city names indicate rank in population.

Through the courtesy of W. M. Steuart, Director, and Starke M. Grogan, Chief Statistician for Statistics of States and Cities of the Bureau of the Census, THE AMERICAN CITY *is again privileged to publish, in advance of issuance by the Department of Commerce, a tabulation of important financial statistics of cities. Those here presented are for the fiscal year* 1926 *and cover all cities having* 100,000 *population and over, according to the Census Bureau's estimates of population for the middle of the fiscal year reported.*

Similar figures for cities of 30,000 *to* 50,000 *population were published in* THE AMERICAN CITY *for November,* 1927, *and for those of* 50,000 *to* 100,000 *population in October.*

GOVERNMENTAL-COST PAYMENTS, CONTINUED

Schools	Libraries	Recreation	Miscellaneous	Net Debt Total	Net Debt Per Capita	Per Capita Assessed Valuation for City Government	Per Capita Levy for All Purposes	Per Capita Levy for Government of City	Estimated Population
$107,528,011	$2,496,202	$6,521,180	$23,165,584	$1,326,051,037	$223.84	$2,388.97	$61.01	$58.05	5,924,000
18.15	0.42	1.10	3.91						
34.3	0.8	2.1	7.4						
42,099,833	1,323,798	6,165,222	6,766,178	204,428,579	67.07	617.48	57.28	53.26	3,048,000
13.81	0.43	2.02	2.22						
32.8	1.0	4.8	5.3						
23,444,325	652,658	4,931,029	6,648,983	357,721,309	178.15	2,090.77	43.39	43.39	2,008,000
11.68	0.33	2.46	3.31						
29.2	0.8	6.1	8.3						
17,481,416	960,561	2,297,258	1,926,246	206,246,224	102.65	2,489.16	67.95	62.67	1,268,000
13.79	0.76	1.81	1.52						
31.1	1.7	4.1	3.4						
15,031,271	1,210,148	601,946	1,625,335	136,870,917	142.57	2,187.29	52.71	52.17	960,000
15.66	1.26	0.63	1.69						
39.5	3.2	1.6	4.3						
9,616,629	383,469	1,318,706	395,250	24,956,206	30.29	1,516.81	36.71	35.05	824,000
11.67	0.47	1.60	0.88						
32.8	1.3	4.5	1.3						
7,695,714	311,255	1,086,824	1,330,586	117,041,762	144.85	2,017.18	38.66	34.15	808,000
9.52	0.39	1.35	1.65						
28.9	1.2	4.1	5.0						
14,537,408	835,707	2,608,463	2,844,091	98,558,171	125.23	2,411.76	76.69	72.78	787,000
18.47	1.06	3.31	3.61						
30.4	1.7	5.4	5.9						
23,844,409	816,832	1,321,796	987,586	187,691,997					
1	1	1	1	1	1	1	1	1	1
43.6	1.5	2.4	1.8						
10,267,696	517,593	721,732	1,441,768	101,842,123	159.88	1,664.07	63.27	63.27	637,000
16.12	0.81	1.13	2.26						
31.9	1.6	2.2	4.5						
7,021,494	202,529	1,380,483	1,376,800	80,701,666	143.60	1,305.73	53.93	53.93	562,000
12.49	0.36	2.46	2.45						
28.6	0.8	5.6	5.6						
9,633,439	296,184	1,404,946	1,699,032	72,596,963	134.19	1,854.94	62.75	60.45	541,000
17.81	0.55	2.60	3.14						
32.1	1.0	4.7	5.7						
7,696,845	210,338	1,198,741	935,591	.....	.....	2,761.14	36.87	36.87	521,000
14.77	0.40	2.30	1.80						
30.7	0.8	4.8	3.7						
7,253,911	377,703	1,320,238	1,085,051	39,753,264	76.89	1,777.11	50.47	50.19	517,000
14.03	0.73	2.55	2.10						
31.2	1.6	5.7	4.7						
8,333,200	285,740	679,160	862,101	70,498,151	153.59	1,681.74	61.36	53.94	459,000
18.16	0.62	1.48	1.88						
33.7	1.2	2.7	3.5						
6,978,054	380,467	783,360	697,361	49,926,005	115.04	947.37	51.24	47.35	434,000
16.08	0.88	1.80	1.61						
40.4	2.2	4.5	4.0						
3,458,102	71,522	299,293	265,879	44,504,692	106.22	1,188.76	44.93	36.89	419,000
8.25	0.17	0.71	0.63						
30.8	0.6	2.7	2.4						
6,670,626	235,635	220,972	1,218,047	82,499,973	200.73	2,529.44	53.47	52.84	411,000
16.23	0.57	0.54	2.96						
38.0	1.3	1.3	6.9						
5,540,090	203,384	369,204	177,120	36,805,489	99.47	1,320.95	44.42	42.65	370,000
14.97	0.55	1.00	0.48						
37.1	1.4	2.5	1.2						
4,757,264	270,404	320,641	392,231	72,023,433	1	1	1	1	1
1	1	1	1						
33.6	1.9	2.3	2.8						
4,754,581	296,925	520,693	383,071	31,434,096	85.65	1,762.26	46.87	42.47	367,000
12.96	0.81	1.42	1.04						
38.0	2.4	4.2	3.1						
6,240,397	210,369	627,475	1,050,180	38,147,473	118.84	1,556.66	49.60	47.43	321,000
19.44	0.66	1.95	3.27						
37.0	1.2	3.7	6.2						
4,538,081	200,423	477,718	772,605	76,891,239	241.80	1,902.53	68.11	59.52	318,000
14.27	0.63	1.50	2.43						
26.1	1.2	2.7	4.4						
2,847,802	133,514	245,970	229,099	19,218,362	62.40	1,260.42	38.51	29.72	308,000
9.25	0.43	0.80	0.74						
34.9	1.6	3.0	2.8						

For notes, see end of table. Numbers at left of city names indicate rank in population.

	Group III Cities of 100,000 to 300,000	Governmental-Cost Payments for Expenses of Municipal Departments: 1926						
		All General Departments	General Government	Protection to Person and Property	Conservation of Health	Sanitation	Highways	Charities, Hospitals, and Corrections
25	Akron, Ohio	$5,647,428	$306,163	$799,967	$114,283	$383,432	$659,368	$114,204
	Per capita	1	1	1	1	1	1	1
	Per cent of total		5.4	14.2	2.0	6.8	11.6	2.0
26	Toledo, Ohio	8,644,981	437,310	1,812,068	116,766	445,297	1,311,992	136,258
	Per capita	29.31	1.48	6.14	0.40	1.51	4.44	0.46
	Per cent of total		5.1	20.9	1.4	5.2	15.1	1.6
27	Portland, Oregon	8,733,434	530,776	2,037,349	121,559	445,832	680,276	80,284
	Per capita	1	1	1	1	1	1	1
	Per cent of total		6.1	23.4	1.4	5.1	7.8	0.6
28	Columbus, Ohio	7,781,204	501,080	1,570,802	99,244	553,959	597,385	62,544
	Per capita	27.30	1.76	5.51	0.35	1.94	2.10	0.22
	Per cent of total		6.4	20.1	1.3	7.1	7.7	0.8
29	Denver, Colo	11,556,255	1,156,316	2,052,347	223,586	469,384	1,173,563	671,425
	Per capita	40.55	4.06	7.20	0.78	1.65	4.12	2.36
	Per cent of total		10.0	17.8	1.9	4.1	10.1	5.8
30	Providence, R. I	9,040,610	490,849	2,322,118	328,842	581,977	1,029,874	286,685
	Per capita	33.12	1.80	8.52	1.20	2.13	3.77	1.05
	Per cent of total		5.4	25.7	3.8	6.4	11.4	3.2
31	Oakland, Calif	8,965,004	488,469	2,221,249	166,746	389,601	637,547	21,220
	Per capita	34.88	1.90	8.64	0.65	1.52	2.48	0.08
	Per cent of total		5.4	24.8	1.9	4.3	7.1	0.2
32	St. Paul, Minn	8,089,347	561,211	1,821,636	134,728	306,992	772,136	309,169
	Per capita	32.62	2.26	7.35	0.54	1.24	3.12	1.25
	Per cent of total		6.9	22.5	1.7	3.8	9.6	3.8
33	Atlanta, Ga	6,443,746	294,912	1,468,749	239,531	455,642	558,395	589,895
	Per capita	1	1	1	1	1	1	1
	Per cent of total		4.6	22.7	3.7	7.1	8.7	9.2
34	Omaha, Neb	6,794,984	377,133	1,537,708	103,529	191,974	488,107	114,555
	Per capita	31.46	1.75	7.12	0.48	0.89	2.26	0.53
	Per cent of total		5.6	22.6	1.5	2.8	7.2	1.7
35	Birmingham, Ala	4,595,185	271,448	1,126,060	95,355	285,936	350,620	58,131
	Per capita	21.99	1.30	5.39	0.46	1.37	1.68	0.28
	Per cent of total		5.9	24.5	2.1	6.2	7.7	1.3
36	San Antonio, Tex	4,385,125	212,273	897,083	76,015	376,180	622,476	53,802
	Per capita	21.82	1.06	4.47	0.38	1.87	3.10	0.27
	Per cent of total		4.8	20.5	1.7	8.6	14.2	1.2
37	Dallas, Tex	5,284,879	274,030	1,110,002	119,673	458,801	582,124	260,928
	Per capita	26.69	1.38	5.61	0.60	2.32	2.94	1.32
	Per cent of total		5.2	21.0	2.3	8.7	11.0	4.9
38	Worcester, Mass	8,732,128	373,178	1,777,918	285,292	506,635	916,289	941,836
	Per capita	45.24	1.93	9.22	1.48	2.63	4.75	4.88
	Per cent of total		4.3	20.4	3.3	5.8	10.5	10.8
39	Richmond, Va	5,148,351	496,884	1,209,956	173,873	372,555	488,014	251,378
	Per capita	27.24	2.63	6.40	0.92	1.97	2.58	1.33
	Per cent of total		9.7	23.6	3.4	7.2	9.5	4.9
40	Syracuse, N. Y	7,480,880	445,578	1,494,719	242,146	662,738	874,892	466,244
	Per capita	40.44	2.41	8.07	1.31	3.58	4.73	2.52
	Per cent of total		6.0	20.0	3.2	8.9	11.7	6.2
41	New Haven, Conn	6,218,443	359,688	1,574,119	131,688	284,394	424,324	243,992
	Per capita	34.17	1.98	8.65	0.72	1.56	2.33	1.34
	Per cent of total		5.8	25.3	2.1	4.6	6.8	3.9
42	Memphis, Tenn	5,018,538	227,989	1,175,051	184,629	441,267	511,713	420,851
	Per capita	28.35	1.29	6.63	1.04	2.49	2.89	2.38
	Per cent of total		4.5	23.4	3.7	8.8	10.2	8.4
43	Dayton, Ohio	4,992,506	320,806	803,630	48,514	320,631	469,188	201,432
	Per capita	28.21	1.81	4.54	0.27	1.81	2.65	1.14
	Per cent of total		6.4	16.1	1.0	6.4	9.4	4.0
44	Norfolk, Va	3,840,441	293,404	1,254,329	52,685	368,666	234,435	134,986
	Per capita	22.07	1.69	7.21	0.30	2.12	1.35	0.78
	Per cent of total		7.6	32.6	1.4	9.6	6.1	3.5
45	Houston, Tex	5,325,277	305,050	1,058,523	168,438	453,240	589,093	188,843
	Per capita	1	1	1	1	1	1	1
	Per cent of total		5.7	19.9	3.2	8.5	11.1	3.5
46	Bridgeport, Conn	5,316,556	249,643	1,379,005	177,461	386,694	340,834	324,442
	Per capita	1	1	1	1	1	1	1
	Per cent of total		4.7	26.0	3.3	7.3	6.4	6.1
47	Youngstown, Ohio	4,062,680	244,814	598,651	63,691	152,404	424,201	76,571
	Per capita	24.62	1.48	3.62	0.39	0.92	2.57	0.48
	Per cent of total		6.0	14.7	1.6	3.8	10.5	1.9
48	Hartford, Conn	6,566,538	403,492	1,377,268	200,390	541,279	534,656	245,154
	Per capita	40.79	2.51	8.56	1.24	3.36	3.33	1.52
	Per cent of total		6.1	21.0	3.1	8.2	8.1	3.7
49	Fort Worth, Tex	3,168,992	227,142	680,722	64,320	219,049	281,046	44,930
	Per capita	20.18	1.45	4.34	0.41	1.40	1.79	0.29
	Per cent of total		7.2	21.6	2.0	6.9	8.9	1.4
50	Grand Rapids, Mich	5,521,189	256,504	1,117,346	252,856	264,019	283,882	108,448
	Per capita	35.85	1.67	7.26	1.64	1.71	1.84	0.70
	Per cent of total		4.6	20.2	4.6	4.8	5.2	2.0
51	Springfield, Mass	7,188,191	391,124	1,411,061	141,398	549,191	871,073	216,462
	Per capita	49.57	2.70	9.73	0.98	3.79	6.01	1.49
	Per cent of total		5.4	19.6	2.0	7.6	12.1	3.0
52	Des Moines, Iowa	5,003,257	247,594	869,384	33,060	339,611	453,232	40,457
	Per capita	34.75	1.72	6.04	0.23	2.36	3.15	0.28
	Per cent of total		4.9	17.4	0.7	6.8	9.1	0.8
53	Scranton, Pa	4,193,442	224,429	827,219	70,626	332,833	387,127	.....
	Per capita	29.32	1.57	5.79	0.49	2.33	2.71	....
	Per cent of total		5.4	19.7	1.7	7.9	9.3	....
54	Paterson, N. J	5,365,412	191,931	1,288,676	161,181	461,813	254,056	140,464
	Per capita	37.52	1.34	9.01	1.13	3.23	1.78	0.98
	Per cent of total		3.6	24.0	3.0	8.6	4.7	2.6

For notes, see end of table. Numbers at left of city names indicate rank in population.

GOVERNMENTAL-COST PAYMENTS, CONTINUED

Schools	Libraries	Recreation	Miscellaneous	Net Debt Total	Net Debt Per Capita	Per Capita Assessed Valuation for City Government	Per Capita Levy for All Purposes	Per Capita Levy for Government of City	Estimated Population
$2,919,375	$43,410	$51,681	$255,545	$35,298,237	1	1	1	1	1
1	1	1	1						
51.7	0.8	0.9	4.5						
3,711,720	182,096	125,867	365,607	30,000,652	$101.70	$1,940.93	$49.30	$41.02	295,000
12.58	0.62	0.43	1.24						
42.9	2.1	1.5	4.2						
4,203,283	.....	466,383	197,692	40,758,637	1	1	1	1	1
1	....	1	1						
48.1	....	5.3	2.3						
3,803,934	63,521	117,516	411,219	25,697,444	90.17	2,052.14	42.27	35.63	285,000
13.35	0.22	0.41	1.44						
48.9	0.8	1.5	5.3						
4,403,178	217,079	731,607	457,770	32,189,532	112.95	1,526.76	48.70	43.10	285,000
15.45	0.76	2.57	1.61						
38.1	1.9	6.3	4.0						
3,327,001	43,000	300,967	329,297	24,183,456	88.58	2,186.48	40.65	38.03	273,000
12.19	0.16	1.10	1.21						
36.8	0.5	3.3	3.6						
4,390,331	141,712	398,267	109,862	18,879,124	73.46	895.67	50.90	37.93	257,000
17.08	0.55	1.55	0.43						
49.0	1.6	4.4	1.2						
3,279,465	259,380	353,490	291,140	27,402,015	110.49	1,075.14	50.48	34.61	248,000
13.22	1.05	1.43	1.17						
40.5	3.2	4.4	3.6						
2,416,576	101,593	170,516	147,937	8,821,550	1	1	1	1	1
1	1	1	1						
37.5	1.6	2.6	2.3						
3,485,502	88,168	182,280	226,028	33,598,662	155.55	1,585.89	45.59	37.81	216,000
16.14	0.41	0.84	1.05						
51.3	1.3	2.7	3.3						
2,141,461	93,541	106,705	65,928	14,295,132	68.40	923.47	33.24	16.62	209,000
10.25	0.45	0.51	0.32						
46.6	2.0	2.3	1.4						
1,918,388	34,662	160,816	33,430	20,700,191	102.99	950.92	36.01	24.82	201,000
9.54	0.17	0.80	0.17						
43.7	0.8	3.7	0.8						
2,132,661	26,040	262,295	58,315	20,510,199	103.59	1,133.93	37.97	28.01	198,000
10.77	0.13	1.32	0.29						
40.4	0.5	5.0	1.1						
3,272,724	146,078	191,684	320,494	8,447,184	43.77	1,674.52	49.23	44.26	193,000
16.96	0.76	0.99	1.66						
37.5	1.7	2.2	3.7						
1,848,948	49,034	132,974	124,735	25,552,985	135.20	1,486.75	37.40	29.58	189,000
9.78	0.26	0.70	0.66						
35.9	1.0	2.6	2.4						
2,573,663	95,471	204,323	421,106	21,577,627	116.64	1,452.59	49.35	39.66	185,000
13.91	0.52	1.10	2.28						
34.4	1.3	2.7	5.6						
2,720,781	88,212	197,002	194,243	10,611,166	58.30	1,693.04	42.33	40.73	182,000
14.95	0.48	1.08	1.07						
43.8	1.4	3.2	3.1						
1,656,046	68,640	295,706	36,646	24,976,216	141.11	1,338.91	47.73	29.46	177,000
9.36	0.39	1.67	0.21						
33.0	1.4	5.9	0.7						
2,258,381	163,056	152,348	254,520	16,496,987	93.20	1,901.71	45.26	37.31	177,000
12.76	0.92	0.86	1.44						
45.2	3.3	3.1	5.1						
1,343,336	38,458	56,585	63,557	33,266,958	191.19	1,051.57	31.98	27.77	174,000
7.72	0.22	0.33	0.37						
35.0	1.0	1.5	1.7						
2,249,562	48,345	198,756	65,427	29,783,124	1	1	1	1	1
1	1	1	1						
42.2	0.9	3.7	1.2						
1,995,517	114,233	166,867	171,860	14,180,000	1	1	1	1	1
1	1	1	1						
37.5	2.1	3.1	3.2						
2,148,877	69,654	147,058	134,759	10,347,053	62.71	2,244.07	44.64	37.95	165,000
13.02	0.42	0.89	0.82						
52.9	1.7	3.6	3.3						
2,677,253	55,000	332,966	199,080	15,757,163	97.87	1,978.48	40.01	37.94	161,000
16.63	0.34	2.07	1.24						
40.8	0.8	5.1	3.0						
1,427,988	35,548	172,152	16,095	15,977,051	101.12	1,017.66	39.79	25.54	158,000
9.10	0.23	1.10	0.10						
45.1	1.1	5.4	0.5						
2,846,294	142,105	181,553	68,182	12,045,246	78.22	1,557.26	47.20	37.31	154,000
18.48	0.92	1.18	0.44						
51.6	2.6	3.3	1.2						
2,968,325	172,510	298,016	199,031	14,410,829	99.39	2,094.03	59.89	54.11	145,000
20.26	1.19	2.06	1.37						
40.9	2.4	4.1	2.8						
2,663,366	109,179	150,457	96,917	17,433,603	121.07	550.16	53.30	40.70	144,000
18.50	0.76	1.04	0.67						
53.2	2.2	3.0	1.9						
2,026,559	31,545	123,053	170,051	4,416,454	30.88	566.59	38.93	31.73	143,000
14.17	0.22	0.86	1.19						
48.3	0.8	2.9	4.1						
2,444,540	67,350	133,004	222,388	14,344,347	100.31	1,339.69	48.84	37.35	143,000
17.09	0.47	0.93	1.56						
45.9	1.3	2.5	4.1						

For notes, see end of table. Numbers at left of city names indicate rank in population.

GOVERNMENTAL-COST PAYMENTS FOR EXPENSES OF MUNICIPAL DEPARTMENTS: 1926

	Group III Cities of 100,000 to 300,000	All General Departments	General Government	Protection to Person and Property	Conservation of Health	Sanitation	Highways	Charities, Hospitals and Corrections
55	Jacksonville, Fla.	$3,407,529	$197,586	$767,663	$74,815	$405,243	$463,857	$64,120
	Per capita	1	1	1	1	1	1	1
	Per cent of total		5.8	22.6	2.2	11.9	13.6	1.9
56	Nashville, Tenn.	2,852,177	165,291	764,074	58,050	189,716	370,618	179,151
	Per capita	20.82	1.21	5.57	0.42	1.38	2.71	1.31
	Per cent of total		5.8	26.8	2.0	6.7	13.0	6.3
57	Trenton, N. J.	4,647,895	211,995	1,008,333	201,995	317,036	400,609	110,070
	Per capita	34.69	1.58	7.52	1.51	2.37	2.99	0.82
	Per cent of total		4.6	21.7	4.3	6.8	8.6	2.4
58	Salt Lake City, Utah	3,715,255	268,907	475,451	81,206	141,571	358,300	37,956
	Per capita	27.93	2.02	3.58	0.61	1.06	2.70	0.29
	Per cent of total		7.2	12.8	2.2	3.8	9.6	1.0
59	Tulsa, Okla.	2,782,336	147,632	520,445	37,486	131,082	145,300	17,368
	Per capita	21.08	1.12	3.94	0.28	0.99	1.10	0.13
	Per cent of total		5.3	18.8	1.3	4.7	5.2	0.6
60	Flint, Mich.	3,703,607	175,691	718,486	89,409	284,832	214,964	264,130
	Per capita	28.27	1.34	5.48	0.68	2.17	1.64	2.02
	Per cent of total		4.7	19.5	2.4	7.7	5.8	7.1
61	Fall River, Mass.	5,230,370	297,050	1,013,526	338,383	223,152	508,200	495,220
	Per capita	39.93	2.27	7.74	2.58	1.70	3.88	3.78
	Per cent of total		5.7	19.4	6.5	4.3	9.7	9.5
62	Camden, N. J.	3,994,361	232,571	920,728	97,799	227,126	352,009	89,577
	Per capita	30.49	1.78	7.03	0.75	1.73	2.69	0.68
	Per cent of total		5.8	23.0	2.4	5.7	8.8	2.2
63	Miami, Fla.	6,603,122	280,438	1,325,022	114,341	796,506	1,910,039	747,723
	Per capita	51.99	2.21	10.43	0.90	6.27	15.04	5.89
	Per cent of total		4.2	20.0	1.7	12.1	29.0	11.3
64	Wilmington, Del.	2,809,251	102,891	660,958	22,604	276,100	246,311	7,045
	Per capita	22.84	1.57	5.37	0.18	2.24	2.00	0.06
	Per cent of total		6.9	23.5	0.8	9.8	8.8	0.3
65	Erie, Pa.	2,805,536	157,320	526,887	62,540	146,328	257,922	2,000
	Per capita	1	1	1	1	1	1	1
	Per cent of total		5.6	18.8	2.2	5.2	9.2	0.1
66	Cambridge, Mass.	4,901,224	266,109	914,598	149,313	526,365	536,573	354,027
	Per capita	40.51	2.20	7.55	1.23	4.35	4.43	2.93
	Per cent of total		5.4	18.6	3.0	10.7	10.9	7.2
67	New Bedford, Mass.	5,028,765	284,943	1,102,505	252,546	391,094	414,411	329,419
	Per capita	42.07	2.38	9.22	2.11	3.27	3.47	2.76
	Per cent of total		5.7	21.9	5.0	7.8	8.2	6.6
68	Albany, N. Y.	4,596,203	349,703	1,034,673	167,653	446,689	446,607	315,548
	Per capita	38.62	2.94	8.69	1.41	3.75	3.75	2.65
	Per cent of total		7.6	22.5	3.6	9.7	9.7	6.9
69	Kan as City, Kans.	2,794,063	137,114	604,213	41,025	104,998	210,219	11,662
	Per capita	23.88	1.17	5.17	0.35	0.90	1.80	0.10
	Per cent of total		4.9	21.6	1.5	3.8	7.5	0.4
70	Yonkers, N. Y.	6,385,816	402,006	1,197,360	239,763	589,062	427,296	365,317
	Per capita	55.05	3.47	10.31	2.07	5.08	3.69	3.15
	Per cent of total		6.3	18.8	3.8	9.2	6.7	5.7
71	Reading, Pa.	2,657,032	161,890	378,676	58,737	230,144	339,695	270
	Per capita	23.31	1.42	3.32	0.52	2.02	2.98	2
	Per cent of total		6.1	14.3	2.2	8.7	12.7	1
72	Duluth, Minn.	3,473,490	261,744	665,132	76,182	103,971	293,701	35,520
	Per capita	30.74	2.32	5.88	0.67	0.92	2.60	0.31
	Per cent of total		7.5	19.1	2.2	3.0	8.5	1.0
73	Elizabeth, N. J.	3,304,345	171,374	858,309	76,548	253,650	284,182	82,096
	Per capita	1	1	1	1	1	1	1
	Per cent of total		5.0	25.3	2.3	7.5	8.3	2.4
74	Lowell, Mass.	4,262,420	251,554	819,988	161,589	258,518	549,747	330,616
	Per capita	38.65	2.28	7.43	1.47	2.34	4.98	3.00
	Per cent of total		5.9	19.2	3.8	6.1	12.9	7.8
75	San Diego, Calif.							
	Per capita			*Statistics not yet available*				
	Per cent of total							
76	Canton, Ohio	2,398,582	175,999	360,609	49,965	116,548	241,314	28,143
	Per capita	21.81	1.60	3.29	0.45	1.06	2.19	0.26
	Per cent of total		7.3	15.0	2.1	4.9	10.1	1.2
77	Spokane, Wash.	3,337,655	146,901	579,352	66,134	201,027	267,464	33,446
	Per capita	30.62	1.35	5.32	0.61	1.84	2.45	0.31
	Per cent of total		4.4	17.3	2.0	6.0	8.0	1.0
78	Oklahoma City, Okla.	2,968,422	133,191	532,952	41,049	165,603	242,160	41,035
	Per capita	1	1	1	1	1	1	1
	Per cent of total		4.5	18.0	1.4	5.6	8.1	1.4
79	Tacoma, Wash.	2,940,023	177,537	578,518	42,986	93,870	308,868	35,049
	Per capita	27.74	1.67	5.46	0.41	0.89	2.91	0.33
	Per cent of total		6.0	19.7	1.5	3.2	10.5	1.2
80	El Paso, Tex.	2,097,141	118,979	407,712	77,676	158,329	98,994	53,432
	Per capita	19.78	1.12	3.85	0.73	1.49	0.93	0.50
	Per cent of total		5.7	19.4	3.7	7.5	4.7	2.5
81	Waterbury, Conn.	4,066,060	253,683	864,717	76,875	172,164	534,730	164,393
	Per capita	1	1	1	1	1	1	1
	Per cent of total		6.2	21.2	1.9	4.2	13.2	4.0
82	Lynn, Mass.	3,420,159	154,905	727,576	120,347	249,824	344,232	199,337
	Per capita	32.89	1.49	6.99	1.16	2.40	3.31	1.92
	Per cent of total		4.5	21.3	3.5	7.3	10.1	5.8
83	Utica, N. Y.	3,457,117	253,511	658,680	67,104	302,489	234,448	192,357
	Per capita	33.56	2.46	6.40	0.65	2.94	2.28	1.87
	Per cent of total		7.3	19.0	1.9	8.7	6.8	5.6
84	Fort Wayne, Ind.	2,608,751	78,215	543,689	30,710	132,396	180,021	.....
	Per capita	26.09	0.78	5.44	0.31	1.32	1.80	....
	Per cent of total		3.0	20.8	1.2	5.1	6.9	....
85	Somerville, Mass.	2,873,165	140,378	546,934	59,888	296,700	224,571	101,726
	Per capita	28.73	1 40	5.46	0.60	2.97	2.24	1.02
	Per cent of total		4.9	19.0	2.1	10.3	7.8	3.5

For notes, see end of table. Numbers at left of city names indicate rank in population.

GOVERNMENTAL-COST PAYMENTS, CONTINUED

Schools	Libraries	Recreation	Miscellaneous	Net Debt Total	Net Debt Per Capita	Per Capita Assessed Valuation for City Government	Per Capita Levy for All Purposes	Per Capita Levy for Government of City	Estimated Population
$1,069,523	$36,903	$205,182	$122,538	$12,719,769	[1]	[1]	[1]	[1]	[1]
[1]	[1]	[1]	[1]						
31.4	1.1	6.0	3.6						
904,425	29,713	120,577	70,553	11,773,366	$85.94	$1,185.39	$33.43	$20.74	137,000
6.60	0.22	0.88	0.51						
31.7	1.0	4.2	2.5						
2,040,192	73,767	134,684	149,214	11,789,535	87.98	1,511.46	48.31	35.13	134,000
15.23	0.55	1.01	1.11						
43.9	1.6	2.9	3.2						
2,063,657	62,793	174,703	50,711	9,105,925	68.47	1[4]16.19	47.13	29.71	133,000
15.52	0.47	1.31	0.38						
55.5	1.7	4.7	1.4						
1,631,540	42,431	93,635	15,417	14,061,861	106.53	785.17	39.65	29.99	132,000
12.36	0.32	0.71	0.12						
58.6	1.5	3.4	0.6						
1,752,593	37,130	121,147	45,225	15,846,740	120.96	1,216.47	43.80	32.93	131,000
13.38	0.28	0.92	0.35						
47.3	1.0	3.3	1.2						
1,941,596	79,520	130,609	203,114	10,203,047	77.89	1,634.25	46.40	41.38	131,000
14.82	0.61	1.00	1.55						
37.1	1.5	2.5	3.9						
1,734,567	38,301	85,058	216,625	9,407,461	71.81	1,391.72	40.78	26.44	131,000
13.24	0.29	0.65	1.65						
43.4	1.0	2.1	5.4						
946,976	20,000	95,461	366,526	14,180,328	111.66	1,450.73	47.01	30.23	127,000
7.46	0.16	0.75	2.89						
14.3	0.3	1.4	5.6						
1,224,221	45,830	95,033	38,258	10,489,244	85.29	1,034.71	30.42	20.00	123,000
9.95	0.37	0.77	0.31						
43.6	1.6	3.4	1.4						
1,493,036	42,473	31,355	85,666	7,819,081	[1]	[1]	[1]	[1]	[1]
[1]	[1]	[1]	[1]						
53.2	1.5	1.1	3.1						
1,480,990	70,512	248,598	354,139	5,995,762	49.55	1,375.89	44.72	40.18	121,000
12.24	0.58	2.05	2.93						
30.2	1.4	5.1	7.2						
1,839,454	75,820	142,677	195,896	12,585,370	105.28	1,860.88	51.73	45.69	[2]119,539
15.39	0.63	1.19	1.64						
36.6	1.5	2.8	3.9						
1,317,900	79,000	215,156	223,274	14,399,944	121.01	1,574.22	51.77	44.26	119,000
11.07	0.66	1.81	1.88						
28.7	1.7	4.7	4.9						
1,552,536	34,496	60,931	36,869	13,879,943	118.63	1,227.59	43.02	34.61	117,000
13.27	0.29	0.52	0.32						
55.6	1.2	2.2	1.3						
2,690,100	38,617	109,307	326,988	19,370,083	166.98	2,119.13	74.95	63.00	116,000
23.19	0.33	0.94	2.82						
42.1	0.6	1.7	5.1						
1,282,688	34,290	77,581	93,061	8,980,618	78.78	1,414.56	35.16	29.71	114,000
11.25	0.30	0.68	0.82						
48.3	1.3	2.9	3.5						
1,776,835	61,465	92,879	106,061	10,751,792	95.15	1,168.57	50.61	39.37	113,000
15.72	0.54	0.82	0.94						
51.2	1.8	2.7	3.1						
1,473,454	41,782	61,459	91,491	4,484,203	[1]	[1]	[1]	[1]	[1]
[1]	[1]	[1]	[1]						
43.4	1.2	1.8	2.7						
1,494,816	33,672	51,334	280,586	5,426,800	49.20	1,322.90	44.18	39.30	[2]110,296
13.55	0.31	0.74	2.54						
35.1	0.8	1.9	6.6						
									110,000
1,294,553	14,835	21,701	94,915	12,556,506	114.15	2,047.30	43.04	35.86	110,000
11.77	0.13	0.20	0.86						
54.0	0.6	0.9	4.0						
1,783,369	65,439	128,465	66,058	4,492,068	41.21	788.82	46.08	26.59	109,000
16.36	0.60	1.18	0.61						
53.4	2.0	3.8	2.0						
1,647,010	43,303	78,658	43,561	12,154,614	[1]	[1]	[1]	[1]	[1]
[1]	[1]	[1]	[1]						
55.5	1.5	2.6	1.5						
1,471,553	46,824	136,493	48,325	11,945,503	112.69	604.62	45.77	24.91	106,000
13.88	0.44	1.29	0.46						
50.1	1.6	4.6	1.6						
1,050,132	25,637	99,732	6,518	6,744,906	63.63	950.19	29.86	18.58	106,000
9.91	0.24	0.94	0.06						
50.1	1.2	4.8	0.3						
1,729,015	45,387	116,359	108,737	13,751,284	[1]	[1]	[1]	[1]	[1]
[1]	[1]	[1]	[1]						
42.5	1.1	2.9	2.7						
1,206,406	56,837	140,876	219,819	5,794,742	55.72	1,203.88	37.07	33.06	104,000
11.60	0.55	1.35	2.11						
35.3	1.7	4.1	6.4						
1,399,406	83,659	96,093	169,370	7,766,028	75.40	1,277.50	41.14	32.74	103,000
13.59	0.81	0.93	1.64						
40.5	2.4	2.8	4.9						
1,407,212	84,793	87,813	63,902	4,543,576	45.44	2,265.29	45.08	32.57	100,000
14.07	0.85	0.88	0.64						
53.9	3.3	3.4	2.4						
1,142,970	61,739	118,171	180,088	1,457,000	14.57	1,092.62	32.12	28.69	100,000
11.43	0.62	1.18	1.80						
39.8	2.1	4.1	6.3						

[1] Per capita not computed; population not estimated. [2] Population, State census, 1925.
[3] Less than one-half of 1 cent. [4] Less than one-twentieth of 1 per cent.

Municipal Problems Through the Cartoonists' Eyes

The Hungry Mosquito—the Timid Pedestrian—and the Splashing Mayor

"My Dears: I've found a fine place to eat. It's New Haven and near by. Hundreds of acres of standing water to raise your families. Fat, juicy children for food. Bald-headed men and thin-clad women—wonderful for biting! Then . . . plenty of high grass and weeds to rest on. Come on! There's the place for a good time this summer."

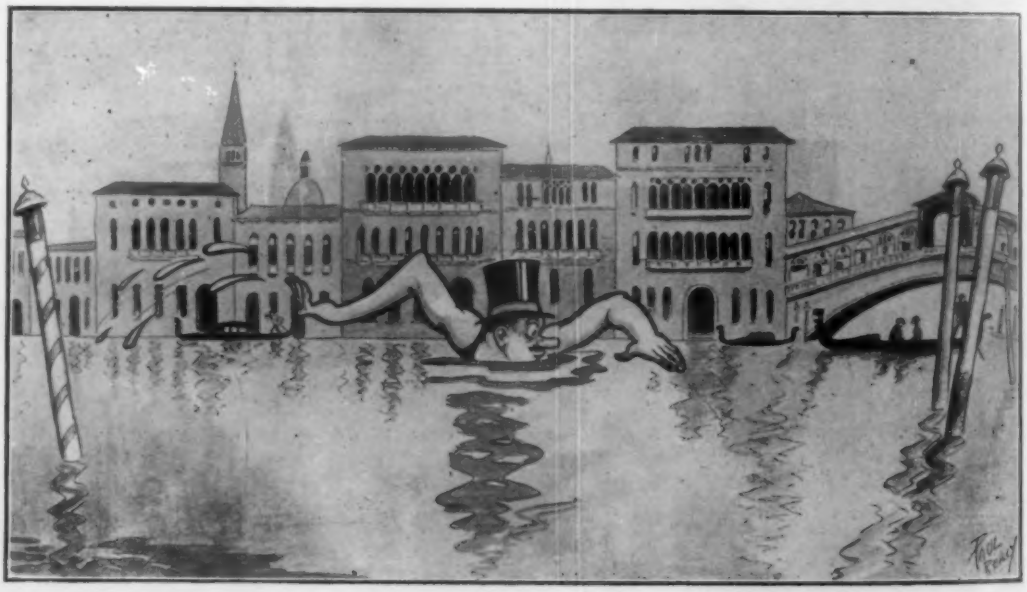
CITIZENS—ARE WE GOING TO STAND FOR THIS?

NEW HAVEN CHAMBER OF COMMERCE

A CARTOON WHICH HELPED IN AN ANTI-MOSQUITO CAMPAIGN

THE PEDESTRIAN OF THE NEAR FUTURE

Montreal Daily Star.



THE MAYOR OF VENICE ON HIS WAY TO THE CITY HALL

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The Neglected Small-Town Fire Department

By A. C. Altwater
Fire Chief, Sebring, Fla.

THE Mississippi merchant whose criticism of small-town fire departments is quoted in THE AMERICAN CITY for August (page 157) realizes a serious situation better than many city officials and state executives—better even than many fire department executives. The spelling and punctuation of his communication were somewhat original; his remarks were pointed and forceful, his observation keen and his philosophy realistic.

Many a small city has passed through or is still in the period to which he refers—where nozzles are not to be found on the truck, where wrenches are misplaced, chemical tanks almost empty, and numerous other deficiencies are encountered, causing a great deal of loss to the public. It is difficult to secure funds to pay for an adequate department in these places; yet in most cases, police departments are properly manned and equipped, water departments are established and sewers installed long before fire departments receive sufficient consideration—unless a big fire loss wakes the community up. Even in the latter event, in some cases a town has bought an expensive piece of apparatus and promptly buried it in a public garage or a shed in some rear alley.

There is frequently selected as chief a local man, perhaps a garage mechanic or a merchant, who may know nothing about the profession of fire prevention or extinguishment, and pays no attention to his equipment except when the siren blows; yet he is supposed to protect the lives and property of every individual in his city. Even though he may be very willing and thoroughly interested in the department, he lacks practical experience, and although he might be glad to go to a training school if he could, few cities of the class here considered feel that they have the money to send him. As a result he is practically helpless in the face of a big disaster.

Initiative Needed

A great deal can be accomplished in the improvement of the fire department in a small town if a small group or even a single individual starts something with the determination to carry it through to a successful finish. When the ball is rolling in the right direction, plenty of help will be found. Such individuals have to do a great deal of gratuitous work, in finding out the handicaps that other fire departments have worked under, eliminating these from the local department, and incorporating the desirable features of other departments into their own. The cost of their education along these lines will have to be met by themselves as a rule, and as there is no textbook from which it can be readily gleaned, the cost may be considerable.

One small city, now numbering a few thousand inhabitants, had in service, when very much smaller, a dozen years ago, twenty hydrants, about a mile and a half of 4-inch mains and an elevated 50,000-gallon reservoir, giving a water-supply of 90 gallons per minute, and fire-fighting equipment consisting of a thousand feet of 2½-inch hose mounted on hand-drawn reels. At that time this seemed adequate, but the loss of a rather large store proved otherwise. Thereupon the Council invested in a two-tank hand-drawn chemical engine and later in a Ford truck mounting a 40-gallon chemical tank, a 20-foot ladder and a 14-foot ladder.

Soon after this was put into service, the purchase of a triple combination car was urged, but put off on the plea of "lack of funds." The loss of a $60,000 packing-house and an equal value in payrolls for the year proved that such a truck was necessary. A 750-gallon pumper was bought and delivered. The volunteer Department was trained to use it, and after a few weeks all the members who were not assigned to this truck dropped out because of the hard work of pulling the hand-drawn carts through the sand, either on foot or at the rear of a truck or touring car. Finally, only the one man required to operate the pump was left, even the Chief having resigned. As a result, when the fire-alarm sounded, the entire population of the city watched the fire, which naturally burned as much as it could and went out. The chemical tanks were sometimes filled and sometimes not. Even the hose was not always on the truck.

New Life in the Department

A new Chief was appointed by the Mayor for the purpose of making an efficient department. Although serving without pay, ci:-

cumstances made it possible for him to devote practically all of his time to this work. One of the first changes effected was the allowance by the Council of two dollars per call for each volunteer. This went into a fund for the purchase of a hose-truck. The work for the individual volunteers was cut down, and plenty of men became available, who, with comparatively good equipment, took great pride in their work, turned out to practice and, by cooperation with the Street and Sanitary Departments, helped to keep the equipment in shape.

An efficient crew at the fires was a natural result. The losses were small, the praise was large, and that increased the pride. Credit was given to the volunteers, and when it appeared that an additional piece of equipment was necessary, thirty ardent volunteers went gunning for it until their friends, the public, forced the Council to recognize the necessity. Data were obtained, figures were produced, and the administration was convinced that the installation of more equipment (including a new truck and a Gamewell alarm system), the passage and enforcement of suitable ordinances, and the employment of a partially paid crew, would more than pay for the cost of installation and its maintenance in the first year, in reduced insurance rates. As a result, the insurance rating has been raised from fourth class to a flat second class, with an attendant saving to property owners of about half their previous insurance premiums. In the past, when a house caught fire, it was doomed. The record now stands at a total loss of only one house in more than a year. In 1926 the loss record of 5,500, or less than $1.00 per capita, was less than that of any other year in the history of the city, regardless of the fact that the city was at that time more than ten times the size that it was the first few years.

With fewer fires, the men have been able to devote a good deal of their time to enforcing ordinances that will better conditions and reduce the possibility of fires. Much time is devoted to inspection. The men become acquainted with the hazards of the city, eliminating what they can and being better able to cope with the rest in case of fire. This makes quick extinguishing possible and creates an admiring public. This admiration is stimulated by carefully planned articles in the paper and frequent fire prevention campaigns, in which the more or less prominent men of the city are asked to take the leading parts before the public. This makes them a part of the system to further the interests of the Department, by giving them a personal contact with the game, and by making them feel that, without their aid, the Fire Department could not exist; so, even though they are not members directly, they are boosters.

The Department now has three trucks—an American-La France, a Seagrave and a Ford, 3,000 feet of new hose, an adequate Gamewell system, a part-paid crew with three full-time men and a paid Chief, and a wonderful supply of water.

It is often a difficult matter to awaken public officials to the necessity of proper protection against fire. Although fire protection pays good dividends in reduced insurance rates, it is not a direct source of revenue to the city. It is not a novelty, attracting attention and support on account of newness. It sometimes takes the big emergency to bring about realization that the life and prosperity of the city is so largely dependent upon the efficiency of the fire department, and then it is too late for the immediate need.

Nevertheless, the awakening in the small city must be brought about, and this will not be done for it by the big cities. These can take care of themselves; when they want new trucks or additional men, an item is put in the budget and carried, the cost per capita being small. They can maintain fire department schools and send their chiefs to conventions and to other cities to get the latest information. They care little or nothing about the troubles of the small cities.

When officials of cities, large and small, are imbued with the idea that efficient fire departments are essential and dividend-paying propositions, they will be in a position to awaken the general interest and help put across a nation-wide campaign against fire, the greatest of America's wastes.

Town Upheld in Regulating the Keeping of Swine

KEEPING of Swine in Town Enjoined.—(Massachusetts Supreme Judicial Court; Town of Lexington v. Miskell, 157 N. E. 598; decided July 5, 1927.) The Board of Selectmen of the town of Lexington, acting as a board of health, adopted regulations governing the keeping of swine. The defendant kept from 400 to 600 swine on his premises within the town without obtaining a permit as required by the regulations. The Board of Health determined that the keeping of swine by the defendant was a menace and harmful to the inhabitants of the town, and issued an order prohibiting the defendant from keeping swine on his premises. The order was not complied with and the town brought a suit to enjoin the defendant from continuing to exercise the trade or employment of keeping swine in the town. The decree of the lower court enjoined the defendant from keeping swine in the town in violation of the regulations of the Board of Health, and this decree was affirmed by the Supreme Court.

—*Public Health Reports, October 7, 1927.*

Forward Steps

Reported by Municipal Officials, Chamber of Commerce Executives and Others

City Installs Trash Burners

MANKATO, KANS.—Cities having trouble in preventing unsightly accumulations of rubbish and trash with the accompanying fire hazard may profit by the example set by this city. In the summer of 1926, during an unprecented period of drought, Mankato experienced a very severe water shortage. It was barely possible to secure water for household use, and there was practically none available for fire protection. Under such conditions every fire was a potential conflagration, and therefore efforts were made to eliminate all hazards.

One of the measures taken was the adoption of an ordinance strictly regulating the accumulation and disposal of rubbish and trash. To aid in its

MASONRY TRASH BURNER, USED BY CITY OF MANKATO

enforcement and to prevent the burning of trash in the open, the city built a number of masonry trash burners in the rear of the business houses. These trash burners proved so popular that scarcely any difficulty was experienced in enforcing the provisions of the ordinance, and the city officials are very enthusiastic over the results obtained. While the burners were very substantially constructed they were quite inexpensive, and no doubt there are other cities that would find an investment of this sort worth while.

D. F. STANLEY,
Mayor.

Modern Lighting System Displaces Clusters and Arcs

BIRMINGHAM, ALA.—An extensive program of improved street lighting, for which the city, the property owners and the lighting company are jointly responsible, will, when completed, enable Birmingham to boast of one of the best street-lighting systems. It is being installed under the supervision of the engineering department of the Birmingham Electric Co., owner of the equipment, and is expected to extend over several years.

The old lighting system in the business section of Birmingham consisted of five-light ornamental-cluster standards, with a 100-watt bulb in each ball globe. These lights were turned off at midnight, after which the streets were illuminated by means of the old-type enclosed carbon arc lamps, suspended overhead at street intersections. These arc lamps were recently converted to series incandescent, using 4,000-lumen, 7.5-ampere Mazda C lamps, the current being furnished by obsolete constant-current "tube" originally designed to supply current to the arc lamps.

The new system on the business streets consists of 400 single-light General Electric Novalux units, equipped with medium alabaster rippled globes and canopies and mounted on Union Metal standards. The height from sidewalk to light-center, 18 feet, minimizes glare and shadows. Each unit is equipped with a 500-watt, 115-volt Mazda C lamp. Wherever a standard is near a fire-alarm box, a red canopy is used instead of a plain canopy to denote the location of the box. The standards are spaced 100 feet apart, and opposite each other. Corner standards are located in line with the property line so that there are eight at each intersection, thereby providing extra light where traffic is heaviest. After midnight four lights are left burning diagonally opposite each other at intersections.

The underground system from which the lights are fed consists of four-conductor cable, made up of two No. 6 and two No. 8 solid conductors, insulated with varnished cambric and covered with lead and asphaltic jute. The conductors are insulated for 600-volt service. The cable is laid in a bed of sand 18 inches below the top of the sidewalk and just inside the curbing. It is of sufficient size to feed either 750- or 1,000-watt lamps in the units, should future traffic or lighting requirements demand an increase in illumination intensity. The standards are tall enough to accommodate larger lamps without introduction of glare. There is an alley running lengthwise in each block, and all control wires and switches are in these alleys. This arrangement permits a simple control arrangement and allows extensions to be made economically.

The business streets that are being lighted by the new system include portions of First, Second, Third, Fourth and Fifth Avenues.

For thoroughfares, General Electric Novalux basket-type units, equipped with A-Sym-Etric dome refractors and 300-watt, 115-volt Mazda C multiple lamps, are being used. First Avenue, North, from 26th to 85th Street, is being lighted with 210 of these units. The units are attached by galvanized right-angle brackets to wooden distribution poles, and the light sources are 20 feet above the road surface. A staggered arrangement is used, the spacing being 400 feet on each side of the street, reduced to 200 feet at business or community centers.

The lights are fed from the regular 115-volt secondary distribution system. A No. 6 weather-proof pilot wire, operated from the Woodlawn sub-station, about midway on First Avenue, runs in both directions to switches that control five or six lights each. To make up for voltage drop, the pilot wire is re-energized in two places. The distribution of light by these units in the residential section of First Avenue is so even and free from glare that automobiles can be driven safely without bright headlights at speeds from 25 to 35 miles an hour.

The suburbs of Pratt City and Inglenook are also being lighted in this manner, and the suburb of Ensley is being lighted with 108 ornamental units similar to those used in the business section of Birmingham.

H. S. BROWNELL.

NEW LIGHTING STANDARDS IN BIRMINGHAM, ALABAMA

USE OF THE TRACKSON-FORDSON IN THE EXCAVATING JOB FOR THE NEW MAUSOLEUM OF LINCOLN MEMORIAL PARK, PORTLAND, ORE.

Building a Community Mausoleum in a Memorial Park

PORTLAND, ORE.—Lincoln Memorial Park in Portland has recently completed the westerly half of the first terrace of a community mausoleum. Nature has provided a fitting location upon a hillside below which the entire city of Portland extends in grand panorama.

The mausoleum is constructed of reinforced concrete with stucco finish without and Alaska marble within. On one side and at the end of the main corridor large family rooms and sections are located. These are arranged in a series of five crypts approachable through well-appointed gates or chains. Interspersed along the same side are spacious niches for the repose of incinerated remains.

On the opposite side six lateral corridors, with ninety end crypts each, extend from the main corridor and will be centrally divided by a magnificent chapel, with organ and chimes, when the entire terrace is completed. From the rear of the chapel a broad marble stairway will lead to the second terrace.

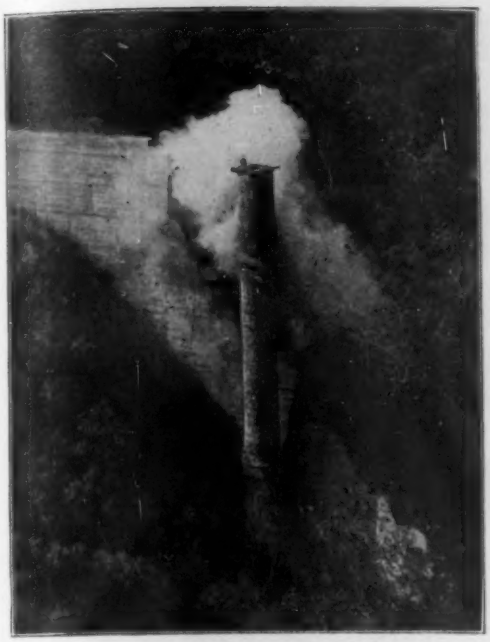
The office and the reception room, at the sides of the marble foyer, are artistically paneled and finished in gumwood. Heated corridors, subdued natural lighting, and tastefully arranged furnishings and palms make the rooms comfortable and harmonious.

In addition to the mausoleum, much work is being done in the development of cemetery plots. Here the Trackson-Fordson, with other equipment, is helping to convert the sloping hillside into a truly wonderful Memorial Park.

C. N. HANSEN,
Secretary, Lincoln Memorial Park, Portland, Ore.

Fighting Fires with Explosives

LOS ANGELES, CALIF.—In the year 1917, when a portion of the city of Atlanta, Ga., was destroyed by a disastrous fire, recruits from the Reserve Officers' Training Camp, at Fort McPherson, near Atlanta, were called out to fight the conflagration, and one of their chief weapons was dynamite. In many cases the most drastic use of explosives was adopted to prevent the spread of the fire. Handsome dwellings were blasted from their foundations as ruthlessly as if they were log cabins. Platoons of young soldiers in charge of commissioned and non-commissioned officers were assigned to the painful duty of destroying homes. These recruits,



DESTROYING STANDPIPE AT SEPULVEDA DAM BY DELAY SHOT SYSTEM

Chimney may be seen cracking at top where first shot occurred. Shots followed in rapid succession down the chimney

however, knew nothing about the use of explosives, and often their work was impotent in preventing the fire's spread or destroyed more property than was necessary. In short, their ignorance of explosives was an extremely costly thing, something that was learned to the distress of the Atlantans after the last smoke of the dis astrous fire had drifted away.

Dynamite is an excellent means of combating fires if used properly by men trained in the technique of explosives. This fact was recognized by the writer last spring when he organized in the Los Angeles Fire Department a Dynamite Corps of sixty men who were given scientific training in the use of explosives.

Near Los Angeles an old abandoned reservoir of reinforced concrete was discovered, and members of the corps were divided into classes and taken there for practical training in the use of explosives. Members of the classes were required to wear overalls and uniform caps to distinguish them from strangers and were made to deposit all matches and tobacco at the entrance to the enclosure, as no smoking was allowed. Officers in charge of the classes first made a survey of the material to be destroyed, assigned flagmen at strategic points and ordered that cordeau be brought in. Cordeau is a detonating cord placed in a small tube containing TNT, and has a detonation velocity of 16,000 feet per second. It was slit and spliced from the main line into the different locations.

Dynamite was then placed at prescribed locations, and dynamite caps were tested and connected to the cordeau. All connections were carefully inspected, and when they were found in satisfactory condition, the vicinity was ordered cleared. connections were made to the "lead" wire, and flagmen were notified that the shots were ready to be fired. A roll call of members of the class followed, the lines were then connected to a battery and the charges were fired.

Special observers were assigned to look over the results of the shots before other members of the class were allowed on the scene. The shots and all the preliminary steps were carefully explained to the class members by explosives experts, special stress being laid on how such shots were to be planned and fired in case of big fires. The class soon became proficient in the use of explosives, and today the Dynamite Corps of the Los Angeles Fire Department is an important part of the fire-fighting outfit in that city.

The firemen were given similar training in connection with flood work, so that they are equipped to handle difficult emergencies with the aid of explosives. The future will probably see other cities adopting similar measures.

R. J. SCOTT,
Chief Engineer, Fire Department, Los Angeles, Calif.

THE PARKING PROBLEM
"PARKS AIRPLANE ON RIVER—THIEF STEALS IT" NEWS ITEM
BACK UP!
PARKING LIMIT 30 MI.
WHERE YA THINK YA GOIN', BELLANCA?
DON'T PARK PLANES NEAR FIRE BOAT
31
PARK YOUR PLANES! PIER 6
Johnstone

A FUTURE PROBLEM OF AIRPLANE PARKING AS VISUALIZED BY JOHNSTONE IN THE NEW YORK WORLD

Public Water-Supplies of Maine---Part II

From a Paper by Elmer W. Campbell, Director, Division of Engineering, Maine State Department of Health, Appearing in the *Journal* of the New England Water Works Association, Vol. 41, No. 2 and Corrected to October 1, 1927

Lisbon Falls
See Lisbon. (*See November issue.*)

Livermore Falls Water District
Supplies the village of Livermore Falls in the town of East Livermore. Population about 2,636. System originally constructed in 1900. The water flows by gravity from a pond to a storage reservoir of 1,000,000 gal. capacity. Two-pressure system, water being pumped from the low-pressure section to the high. Chlorinator installed October, 1923. Fifteen miles of mains. Color 8. Hardness 23. Chlorides 4. Quality of water excellent.

Lincoln Water Co.
Supplies a population of 2,452. System installed in 1912. The water flows by gravity from a pond to a storage reservoir of 500,000 gal. capacity. A river is used as an auxiliary supply. Chlorinator installed on the auxiliary supply November, 1924. There are 10 miles of mains. Color 30. Hardness 18. Chlorides 3. Quality of water excellent.

Long Pond Water Co.
Supplies the village of Sorrento. Population 140. Water-works originally constructed in 1886. It is a gravity supply and the source is a pond. Six miles of pipe line. Color 16. Hardness 13. Chlorides 5. Quality of water excellent.

Lubec Water-Works
Originally constructed in 1902. Serves a population of 3,371. Water is obtained from springs and wells. Steam and electric power are used for pumping. There are two storage reservoirs located near the wells with a total capacity of 1,000,000 gal. and a standpipe of 300,000 gal. capacity located in the town. Chlorinator installed August, 1920. There are 7 miles of pipe. Color 13. Hardness 86. Chlorides 16. The water is variable in quality.

Machias Water Co.
Serves a population of 2,152. System constructed in 1896. Water is obtained from a river, and steam and electric power are used to pump it to a pressure standpipe of 350,000 gal. capacity. Chlorinator installed January, 1920. Six miles of mains. Color 69. Hardness 19. Chlorides 6. This water has rather a high color and some vegetable tastes. Considerable changes are noted at times of heavy rainfall.

Madison Water District
Has a population of 3,700. Water-works installed in 1891. In 1916 the source of water was changed from a river to a pond. The water flows by gravity to a storage reservoir of 600,000 gal. capacity. Pipe line owned jointly by Madison and Anson water districts. There are 30½ miles of pipe line. Color 17. Hardness 20. Chlorides 4. Water of excellent quality.

Manchester
See Augusta Water District.

Mars Hill Water Co.
Supplies a population of 1,873. The system was constructed in 1911. The water flows by gravity from a lake to a storage reservoir of about 500,000 gal. capacity. There are 7 miles of pipe line. Color 15. Hardness 77. Chlorides 4. Quality of water excellent.

Mechanic Falls Water Co.
Supplies a population of 1,614. System constructed in 1895. Water is taken from a brook, steam and electric power being used to pump it to a standpipe of 318,000 gal. capacity. Rapid sand filters are in use and all the water has been sterilized with chlorine since 1919. Six and one-half miles of mains. Color 15. Hardness 35. Chlorides 5. Quality of water excellent.

Meserve, James Y.
This company supplies a portion of the village of Jefferson. The system was installed in 1903 and is a gravity supply from a spring. There are 1½ miles of mains. Color 6. Hardness 41. Chlorides 4. Quality of water excellent.

Mexico Water Co.
Supplies most of the town of Mexico, which has a total population of 3,242. System constructed in 1908. The main supply comes from a brook and flows by gravity to two storage reservoirs with a total capacity of 3,000,000 gal. The auxiliary supply consists of two shallow wells located on the river bank. This supply is pumped by electric power to the reservoirs. Chlorinator installed November, 1926. Five miles of mains. Color 19. Hardness 32. Chlorides 4. Quality of water somewhat variable.
See also E. A. Abbot Water Co., Chase, Joseph, and Rumford and Mexico Water District.

Millbridge Water Co.
Supplies a population of 1,196. The system was installed in 1878. Water is taken from springs and wells and flows to a reservoir of 30,000 gal. capacity. Two and three-quarters miles of mains. Color 6. Hardness 27. Chlorides 9. Water of excellent quality.

Milford
See Penobscot County Water Co.

Millinocket Water Co.
Serves a population of 4,528. The system was constructed in 1901. Water is supplied from the west branch of the Penobscot River and is pumped by electric power. Rapid sand filters are in use. Seven and one-half miles of mains. Color 32. Hardness 23. Chlorides 4. The water is somewhat variable, but usually of excellent quantity.

Milo Water Co.
Serves a population of 2,894. System originally constructed in 1909. Water is pumped by electric power from a stream, which is the outlet of a large lake, to a reservoir of 400,000 gal. capacity. Chlorinator installed August, 1920. Five and one-half miles of mains. Color 27. Hardness 17. Chlorides 3. The water varies in color at times, due to drainage from swamps and timber lands, but otherwise is of good quality.

Monhegan Water Co.
Supplies a population of 133. System installed in 1914. The water is pumped by a gas engine from a drilled well, 38 to 48 ft. deep, to a storage reservoir of 13,000 gal. capacity. One mile of mains. Color 5. Hardness 92. Chlorides 35. Water of excellent quality.

Monson Spring Water Co.
Supplies a portion of the village of Monson, which has a total population of 1,079. The sources of supply are: one drilled well 350 ft. deep; one drilled well 125 ft. deep, and one spring. There are two storage reservoirs with a total capacity of 800,000 gal. One and three-quarters miles of mains. Color 5. Hardness 27. Chlorides 5. Quality of water excellent.

Morrill Water Co.
Supplies a population of 307. The system was installed in 1907. The water is obtained from an artesian well, 70 ft. deep and the source of power is a windmill. There is a storage reservoir with a capacity of 10,000 gal. Three-quarters of a mile of mains. Color 4. Hardness 74. Chlorides 9. The water is of excellent quality.

National Soldiers Home
See Augusta Water District.

Newcastle
See Damariscotta-Newcastle Water Co.

Newport Water Co.
Serves a population of 1,709. System installed in 1894. The water flows by gravity from a lake to two storage reservoirs having a total capacity of 2,000,000 gal. One of these reservoirs, of approximately 500,000 gal. capacity, is maintained for fire protection only and water is pumped to it from the main system by electric power. Chlorinator installed May, 1926. Six miles of mains. Color 33. Hardness 51. Chlorides 6. The water is slightly variable in quality.

New Sharon Water Co.
Supplies a population of 885. System constructed in 1911. The main source of supply is a flowing, driven well 53 ft. deep. The water flows from the well to the storage reservoir of 100,000 gal. capacity and then to the mains. Hypochlorite treatment was installed on the auxiliary supply in July, 1926. There are 2½ miles of mains. Color 14. Hardness 55. Chlorides 5. The main supply is excellent in quality. If it proves insufficient, the company plans to pump from a spring.

Norridgewock Water Co.
Supplies a portion of the village of Norridgewock. Total population 1,532. The system was constructed in 1912. The water is obtained from a spring and a brook and flows by gravity to a storage reservoir of 1,500 gal. capacity. One mile of mains. Color 7. Hardness 51. Chlorides 9. The water is not of the best quality owing to drainage from dwellings at a higher elevation than the spring.

North Anson
See Anson Water District.

North Berwick Water Co.
Supplies a total population of 1,652. System installed in 1896. The water is pumped by electric power to a standpipe with a capacity of 200,000 gal. A rapid sand filter improves the appearance of the water. Chlorinator installed March, 1919. Five and three-fifths miles of mains. Color 31. Hardness 33. Chlorides 6. The water varies in color at different times of the year but usually is of good quality.

North Bridgton Water Co.
Supplies the village of North Bridgton in the town of Bridgton. The system was installed in 1910 and is a gravity supply from a spring. About 2 miles of mains. Color 0. Hardness 40. Chlorides 20. Water of excellent quality.

Northeast Harbor Water Co.
Supplies the village of Northeast Harbor in the town of Mt. Desert. The plant was constructed in 1883. Water is pumped from a pond to a standpipe of 24,000 gal. capacity to supply 14 cottages; remainder of community supplied by gravity from pond. Seven miles of mains. Color 15. Hardness 21. Chlorides 8. Quality of water excellent.

Northern Water Co.
Supplies the town of East Millinocket. Population 1,392. The system was installed in 1908. Water is taken from artesian wells. The Penobscot River is used as an auxiliary supply. Electric power is used to pump the water to a standpipe of 375,000 gal. capacity. Chlorinator installed September, 1924. Six miles of mains. Color 28. Hardness 33. Chlorides 5. The water is somewhat variable but usually of good quality.

North Haven Water Co.
Supplies the village of North Haven in the town of North Haven. Total population 510. System constructed in 1911. Source of supply is a pond. There is a standpipe with a capacity of 250,000 gal. Eight miles of mains. Color 37. Hardness 34. Chlorides 12. The water varies in color but otherwise is of good quailty.

Northport Mountain Spring Co.
Supplies the village of Bayside in Northport. Population 466. System installed in 1891. Water is obtained from springs and artesian well. Three miles of pipe line. Color 2. Hardness 65. Chlorides 8. Water of excellent quality.

North New Portland
See North Village Water Co.

North Vassalboro
See Kennebec Water District.

North Village Water Co.
Supplies the village of North New Portland in the town of New Portland. Population 840. The water-works was installed in 1906. The water flows by gravity from a spring to a storage reservoir of 150,000 gal. capacity. Two miles of pipe. Color 5. Hardness 30. Chlorides 4. Quality of water excellent.

Norway Water Co.
Serves a population of 2,969. System constructed in 1886. Water pumped by electric power from a lake to a reservoir of 500,000 gal. capacity. Chlorinator installed June, 1923. Five miles of mains. Color 20. Hardness 28. Chlorides 4. Quality of water excellent.

Oakland Water Co.
Serves a population of 2,473. System installed in 1889. Water pumped by electric power from a lake to a reservoir of 1,000,000 gal. capacity. Chlorinator installed October, 1923. Four and one-half miles of mains. Color 16. Hardness 29. Chlorides 4. Quality of water excellent.

Old Orchard
See Biddeford and Saco Water Co.

Oldtown
See Penobscot County Water Co.

Orono
See Penobscot County Water Co.

Paris Hill Water Co.
Supplies a portion of the village of South Paris. Water is taken from wells. Three miles of mains. Color 6. Hardness 31. Chlorides 4. Water of excellent quality.

Patten Water Co.
Supplies a total population of 1,498. The system was installed in 1893. Water flows by gravity from a spring to a reservoir of 9,500 gal. capacity. An artesian well, 60 ft. deep is used as an auxiliary supply. One and one-quarter miles of mains. Color 9. Hardness 92. Chlorides 7. The water is usually of good quality.

Peaks Island Corporation
Was recently changed to the Casco Bay Water, Light and Power Co. The water-works was constructed in 1910 and supplies a portion of the city of Portland. In the summer, water is secured from the Portland Water District. In the winter it is taken from four drilled wells from 200 to 250 ft. deep. Oil is used as power for pumping. Eight miles of mains. Color 7. Hardness 51. Chlorides 19. Water of excellent quality.

Penobscot County Water Co.
Ellsworth.—This company supplies a population of 3,058. Plant constructed in 1888. Water is pumped by electric power from the outlet of a lake to a standpipe of 301,000 gal. capacity. Chlorinator installed July, 1923. There are 13.2 miles of mains. Color 39. Hardness 23. Chlorides 5. Water varies somewhat in color but usually is of excellent quality.

Oldtown.—Population 6,966. This system was constructed in 1889. Supplies the city of Oldtown and the village of Milford. Water is pumped by electric power from the Penobscot River. Pressure type, rapid sand filters are used for improving the appearance of the water. Chlorinator installed January, 1920. Twenty-three and five-tenths miles of mains. Color 39. Hardness 31. Chlorides 9. The water is variable in quality and sometimes has a considerable amount of vegetable tastes, usually, however, it is of good quality.

Orono.—Population 9,700. This system was constructed in 1888. Supplies the city of Brewer and the towns of Orono and Veazie. The water flows by gravity from a lake, through a syphon under the Penobscot River, to the pumping-station, and is then pumped by electric power to the distributing system. There are two standpipes with a total capacity of 924,000 gal. Chlorinator installed October, 1923. A coarse gravel filter is used at the intake to keep out leaves, floating sticks and other coarse material. Thirty-nine and four-tenths miles of pipe. Color 44. Hardness 29. Chlorides 5. The water is rather highly colored and has some swampy tastes at times, but otherwise is of excellent quality.

People's Water Co.
Supplies a portion of the village of South Paris. Water is obtained from a well. Two miles of mains. Color 10. Hardness 39. Chlorides 4. Water of excellent quality.

Phillips Water Co.
Serves a population of 1,353. The system was installed in 1898. It is a gravity supply from a pond located on the slope of Mt. Blue. There is a storage and equalizing reservoir with a capacity of 500,000 gal. Eight miles of mains. Color 24. Hardness 21. Chlorides 4. The water is slightly colored owing to drainage from wild land but otherwise is of excellent quality.

Pine Tree Aqueduct Co.
Supplies a portion of the village of South Paris. The works was installed in 1879. Water is taken from six drilled wells. Two and one-half miles of mains. Color 7. Hardness 54. Chlorides 4. Water of excellent quality.

Pittsfield Water-Works
Serves a population of 2,700, was constructed in 1894. The source of supply is four wells which are located along the bank of a stream. Electric power is used to pump the

water to a standpipe of 365,000 gal. capacity. Chlorinator installed November, 1923. Eleven miles of mains. Color 10. Hardness 60. Chlorides 9. Water of excellent quality.

Port Clyde
See St. George Water Co.

Portland Water District
Supplies the cities of Portland, South Portland and Westbrook, and the towns of Cape Elizabeth, Scarboro, Gorham, Falmouth and Cumberland. Total population 90,000. The water-works was constructed in 1868. Water is obtained from Sebago Lake and flows by gravity to five standpipes having a total capacity of 2,650,000 gal. There are three reservoirs with a total capacity of 40,000,000 gal. Chlorinator installed April, 1921. Three hundred fifty-six and three-tenths miles of mains. Color 11. Hardness 22. Chlorides 4. Water of excellent quality.

Presque Isle Water Co.
Serves a population of 5,581. The system was installed in 1887. Water comes from a stream and a brook and is pumped by electric power to a reservoir of 1,500,000 gal. capacity. Chlorinator installed February, 1918. Twelve miles of mains. Color 20. Hardness 106. Chlorides 9. The water is variable in quality owing to drainage from agricultural lands.

Quantabacook Water Co.
Supplies the town of Harrington. Population of 1,860. The water flows by gravity from a spring to a reservoir of 50,000 gal. capacity. Five miles of mains. Color 5. Hardness 43. Chlorides 7. Water of excellent quality.

Randolph
See Gardiner Water District.

Rangeley Water Co.
Supplies a population of 1,028. The works was constructed in 1905. Water flows by gravity from a mountain stream to an equalizing reservoir of 450,000 gal. capacity. Eight miles of mains. Color 38. Hardness 20. Chlorides 3. This water varies somewhat owing to drainage from wild timber lands but is generally of excellent quality.

Richmond Water-Works
Installed in 1884 and serves a population of 1,724. The water is pumped by electric power from the Kennebec River through pressure-type, rapid sand filters to the distribution system. There is a storage reservoir of 1,000,000 gal. capacity. Chlorinator installed March, 1921. Seven miles of pipe line. Color 27. Hardness 34. Chlorides 6. The water is somewhat variable in quality owing to mill wastes in the river and sewage from communities up stream. Excellent results have been obtained with the purification system and, although the water occasionally has unpleasant tastes and odors and is somewhat colored, yet it is maintained in a safe condition by the use of chlorine treatment.

Roberge, Joseph
This company supplies a portion of the village of South Berwick. The water is pumped by electric power from a spring into a tank. One-half mile of pipe line. Color 5. Hardness 40. Chlorides 8. Water of excellent quality.

Rockland
See Camden & Rockland Water Co.

Rumford & Mexico Water District
Supplies a population of 8,576. The system was constructed in 1893. Water flows by gravity from a brook to four storage reservoirs with a total capacity of 114,000,000 gal. Built 2,000,000-gallon concrete reservoir in 1926. Twenty-one miles of mains. Color 22. Hardness 25. Chlorides 4. Quality of water excellent.

See also Smith and Greene Water Co.

Saco
See Biddeford and Saco Water Co.

Sanford Water Co.
Serves a population of 10,691. The system was installed in 1887. Water is pumped by electric power from 24 driven wells and five springs located near the Mousam River. There is a storage reservoir of 830,000 gal. capacity. Chlorinator installed, 1923. Fifteen and one-half miles of mains. Color 10. Hardness 57. Chlorides 3. Water of excellent quality.

Sangerville Water Co.
Serves a population of 1,246. System constructed in 1910. Water is secured from the Guilford Water Co. and pumped to a storage standpipe with a capacity of 500,000 gal. Five and one-half miles of pipe.

Seal Harbor Water Co.
Supplies the village of Seal Harbor in the town of Mt. Desert. The system was constructed in 1900. It is a gravity supply from a lake. Six miles of mains. Color 9. Hardness 18. Chlorides 8. Quality of water excellent.

Searsport Water Co.
Supplies a population of 1,373. System constructed in 1906. The water is obtained from the Stockton Springs Water Co. Flows by gravity to a storage reservoir, capacity 300,000 gal. A spring is used as an auxiliary supply. Ten miles of mains. Color 12. Hardness 22. Chlorides 4. Quality of water excellent.

Skowhegan Aqueduct Co.
Supplies a portion of the village of Skowhegan. Works constructed in 1836. The water flows by gravity from five small springs. There are 2 miles of mains. Color 12. Hardness 43. Chlorides 13. The water is somewhat variable in quality owing to drainage from dwellings located at a higher elevation than the springs.
See also Central Aqueduct Co., Coburn Aqueduct Co., Skowhegan Water Co. and West Skowhegan Aqueduct Co.

Skowhegan Water Co.
Supplies the greater part of the village of Skowhegan. Population 5,981. System installed in 1887. Water is pumped by electric power from a storage reservoir, which is supplied by springs. One reservoir, capacity 1,500,000 gal. One new reservoir, 3,000,000 gal. capacity. Standpipe of 270,400 gal. capacity. Auxiliary supply Kennebec River. Chlorinator installed February, 1918. Thirteen miles of mains. Color 24. Hardness 35. Chlorides 7. Water varies a little with the seasons but usually is of excellent quality.
See also Central Aqueduct Co., Coburn Aqueduct Co., Skowhegan Aqueduct Co. and West Skowhegan Aqueduct Co.

Small Point Water Co.
Supplies the summer colony of Small Point in the town of Phippsburg. The plant was installed in 1893. Water is pumped by electric power from a pond to a storage tank, capacity 50,000 gal. Chlorinator installed May, 1926. About 2 miles of mains. Color 102. Hardness 36. Chlorides 19. Water quite variable in color and has vegetable tastes at times but otherwise of good quality.

Smith & Greene Water Co.
Supplies about 50 houses in the town of Rumford. The system was installed in 1908. Obtains water from a spring. There is a storage reservoir of 84,000 gal. capacity located at the spring. One-half mile of pipe. Color 11. Hardness 28. Chlorides 5. The quality of the water is fair but could be made of excellent quality by proper protection.

Sorrento
See Long Pond Water Co.

South Berwick Water Co.
Serves a population of 2,955. System constructed in 1893. Water is secured from a river and pumped by electric power to a storage reservoir, capacity 500,000 gal. Chlorinator installed July, 1921. Six and one-half miles of mains. Color 46. Hardness 35. Chlorides 6. Water is somewhat variable in quality.
See also Roberge, Joseph.

South Freeport Water Co.
Supplies the village of South Freeport in the town of Freeport. The supply is obtained from a well. About 2 miles of mains. Color 6. Hardness 40. Chlorides 7. Quality of water excellent.

South Paris Village Corporation
This is the main supply for the village of South Paris, which has a total population of 3,656. The plant was installed in 1909 and is a gravity supply from a brook. The water flows to two storage reservoirs having a total capacity of 1,500,000 gal. Chlorinator installed, 1921. Eight miles of pipe line. Color 31. Hardness 29. Chlorides 5. The water is somewhat variable in quality on account drainage from agricultural lands.
See also Crystal Fountain Aqueduct Co., Hillside Water Co., Paris Hill Water Co., People's Water Co. and Pine Tree Aqueduct Co.

Southport Water System
This system was constructed in 1923 and supplies the village of Southport, which has a permanent population of 272. This is a summer supply only, at which time the population is approximately 3,000. The water is pumped by electric power from a pond to a standpipe of 125,000 gal. capacity. Twelve miles of mains, practically all on the surface. Chlorinator installed June, 1927. Color 66. Hardness 18. Chlorides 12. The water is quite highly

colored and somewhat variable in quality. Probably could be improved by filtration.

South Portland
See Portland Water District.

Southwest Harbor Water Co.
Serves a population of 824. The system was installed in 1893. Water is obtained from a pond and is pumped to a standpipe. Seven miles of mains. Color 13. Hardness 16. Chlorides 8. Quality of water excellent.

Springvale Aqueduct Co.
Supplies the village of Springvale in the town of Sanford. The system was constructed in 1878. Water flows by gravity from a pond. A slow sand filter is used. Chlorinator installed in the summer of 1924. An auxiliary supply is obtained from the Mousam River. This is also chlorinated. There are 7 miles of mains. Color 13. Hardness 26. Chlorides 4. The water is somewhat variable in quality but usually very excellent.

Stratton Water-Works
Installed in 1900. Supplies the village of Stratton in the town of Eustis. Water flows by gravity from a spring to a small reservoir. Two miles of mains. Color 8. Hardness 34. Chlorides 4. Water of excellent quality.

Steep Falls Water Co.
Plant constructed in 1907. Supplies the village of Steep Falls in the town of Standish. Water is pumped by a windmill from a spring to a small elevated tank of 1,200 gal. capacity. One-half mile of mains. Color 11. Hardness 36. Chlorides 5. The water is somewhat variable in quality but usually excellent.

St. George Water Co.
Supplies the village of Port Clyde in the town of St. George. Works installed in 1909. The source of supply is a drilled well, approximately 180 ft. in depth. The water is pumped to a standpipe of 70,000 gal. capacity. Three miles of mains. Color 16. Hardness 63. Chlorides 25. The water is somewhat variable but generally of good quality.

St. Stephens Water Co.
See Calais Water and Power Co.

Stockton Springs Water Co.
Serves a population of 1,173. The system was installed in 1906. The water flows by gravity from a lake to a storage reservoir of 400,000 gal. capacity. Fourteen miles of mains. Color 11. Hardness 30. Chlorides 5. Water of excellent quality.

Stonington Water Co.
Serves a population of 1,353. Obtains its water from a pond. Water is pumped by a kerosene engine from the pond to a storage reservoir of 350,000 gal. capacity. Hypochlorite treatment begun in July, 1926. Two and one-half miles of mains. Color 105. Hardness 21. Chlorides 13. The water is highly colored and has some vegetable tastes but otherwise is of good quality.

Strong Water District
Supplies a population of 779. System constructed in 1903. The water flows by gravity from a pond to a storage reservoir of 500,000 gal. capacity. Chlorinator installed January, 1927. Six miles of mains. Color 47. Hardness 41. Chlorides 4. The water is somewhat variable but usually of excellent quality.

Sullivan Harbor Water-Works
Installed in 1905. Gravity supply from a pond. Three miles of mains. Color 25. Hardness 26. Chlorides 8. Quality of water excellent.

Thomaston
See Camden and Rockland Water Co.

Topsham
See Brunswick & Topsham Water District.

Union Water Co.
Supplies the village of Union. Total population of 1,133. System constructed in 1895. Water is obtained from an artesian well and flows to a reservoir of 250,000 gal. capacity. One and one-quarter miles of pipe line. Color 10. Hardness 26. Chlorides 6. Water of excellent quality.

Van Buren Water District
Supplies a population of 4,594. The works was installed in 1903. The water flows by gravity from a brook. Water for fire purposes is pumped to a storage reservoir by a gasoline engine. Fire pressure 80 lbs., gravity pressure 45 lbs. The reservoir has a total capacity of 500,000 gal. Chlorinator installed March, 1923. Thirteen miles of mains. Color 24. Hardness 65. Chlorides 4. The water varies in quality a little at times of heavy rainfall but is usually excellent.

Vassalboro
See East Vassalboro Water Co.

Veazie
See Penobscot County Water Co.

Vinalhaven Water Co.
Serves a population of 1,965. Plant installed in 1909. The water is pumped by electric power from a pond to a standpipe of 318,000 gal. capacity. Six and one-half miles of mains. Color 74. Hardness 20. Chlorides 12. The water is usually quite highly colored but otherwise is of good quality.

Waldoboro Water Co.
Supplies a population of 2,426. The system was constructed in 1910. Water is pumped by windmills from artesian wells to reservoir of 2,000,000 gal. capacity. Three and one-half miles of pipe line. Color 8. Hardness 34. Chlorides 6. Water of excellent quality.

Warren Water Co.
Serves a population of 1,500. System installed in 1897. The water is obtained from two artesian wells, pumped to reservoir of 1,000,000 gal. capacity. Two and a half miles of pipe line. Average water pressure 85 lbs. Color 15. Hardness 44. Chlorides 8. Quality of water excellent.

Washburn Water Co.
This system was constructed in 1917. Supplies a population of 1,870. The water is pumped by electric power from three artesian wells to a storage reservoir of 1,000,000 gal. capacity. Two and one-half miles of pipe. Color 5. Hardness 161. Chlorides 11. Quality of water excellent.

Waterville
See Kennebec Water District.

Weeks Mills Water Co.
Supplies the village of Weeks Mills in the town of China. The plant was constructed in 1909. Water is obtained from a spring. It is pumped by a windmill to a reservoir with a capacity of 10,000 gal. One mile of mains. Color 8. Hardness 79. Chlorides 6. The water is variable in quality on account of drainage from agricultural lands.

Wells
See Kennebunk, Kennebunkport & Wells Water District.

Westbrook
See Portland Water District.

West Falmouth Water Co.
Supplies the village of West Falmouth in the town of Falmouth. The system was installed in 1910. Water is secured from a spring and flows by gravity to a reservoir of 2,000 gal. capacity. One mile of pipe line. Color 7. Hardness 61. Chlorides 11. Quality of water excellent.

Western Maine Power Co.
Supplies the town of Limerick. Population of 761. The system was constructed in 1908. Water is taken from springs and artesian wells and is pumped by electric power to a storage reservoir of 275,000 gal. capacity. Chlorinator installed September, 1926. One and three-quarters miles of mains. Color 9. Hardness 34. Chlorides 4. Water of excellent quality.

Westfield Electric Co., Mars Hill
Supplies the village of Westfield. Population of 798. Plant constructed in 1910. The water flows by gravity from a spring and a brook to a reservoir with a capacity of 1,000,000 gal. Hypochlorite treatment begun December, 1926. One mile of pipe line. Color 19. Hardness 174. Chlorides 7. The water is variable in quality owing to drainage from agricultural lands.

West Skowhegan Aqueduct Co.
Supplies the western portion of the town of Skowhegan. The system was constructed in 1836 and reorganized in 1867. Water flows from springs by gravity to customers. About 3 miles of main pipes. The water is of excellent quality, there being no building or sewer within 14 rods of any of the springs, which are protected from surface water. A chlorinator was installed in 1925. Color O. Hardness 64. Chlorides 13.

Wilton Water-Works
Installed in 1897. Serves a population of 2,505. The water comes by gravity from a pond to two storage reservoirs having a total capacity of 800,000 gal. Fifteen miles of pipe line. Color 7. Hardness 37. Chlorides 3. Quality of water excellent.

Winslow
See Kennebec Water District.

Winter Harbor
See Grindstone Neck Water Co.

Winterport Water Co.
Supplies a population of 1,433. The system was constructed in 1896. Water is pumped by electric power from a brook to a standpipe of 200,000 gal. capacity. Chlorinator installed July, 1923. Three and one-half miles of mains. Color 16. Hardness 52. Chlorides 6. The water varies in quality but is usually excellent.

Winthrop Water Co.
Supplies a population of 1,902. Plant installed in 1925. The water is pumped by electric power from a lake to a standpipe of 316,000 gal. capacity. Chlorinator installed April, 1925, as a part of the original construction. Five miles of mains. Color 14. Hardness 27. Chlorides 6. Water of excellent quality.

Wiscasset Water Co.
Supplies a population of 1,192. System was installed in 1916. The water is pumped by electric power from a brook to a storage reservoir of 700,000 gal. capacity. Pressure type, rapid sand filters were installed in 1920 and a chlorinator, July, 1923. Four miles of mains. Color 18. Hardness 31. Chlorides 8. The water varies in quality at times of heavy rainfall but is usually good.

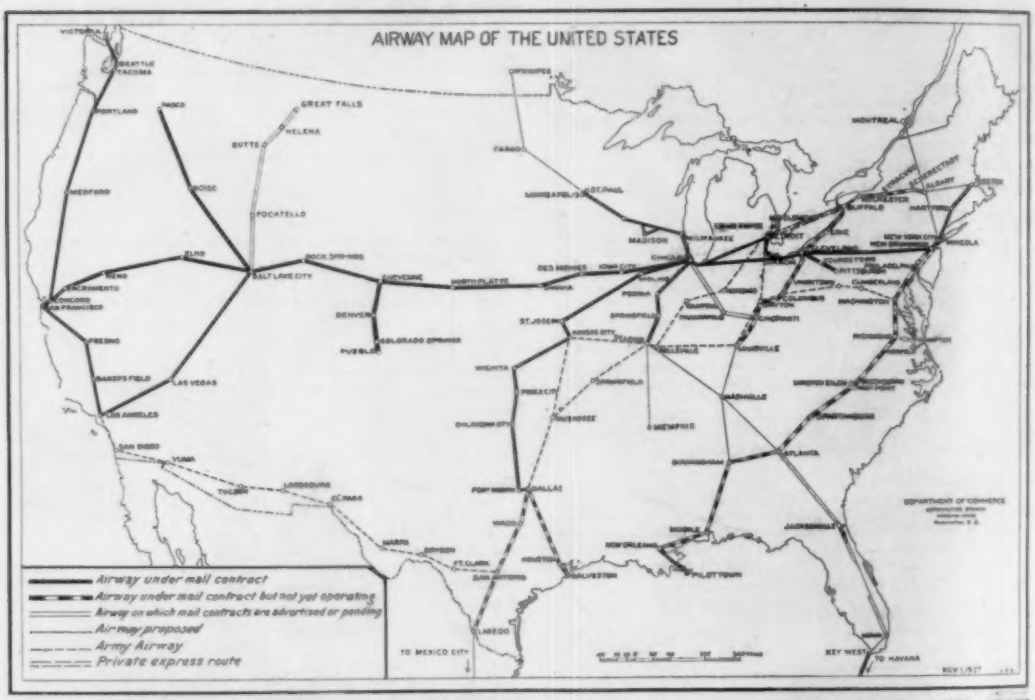
Woodland Light & Water Co.
Supplies the village of Woodland in the town of Baileyville. Population of 2,120. The system was constructed in 1906. Water is obtained from the St. Croix River. There is a standpipe with a capacity of 75,000 gal. Pressure type, rapid sand filters and chlorinator were installed in 1922. About 3 miles of mains. Color 16. Hardness 26. Chlorides 5. The water is somewhat variable in quality but usually excellent.

Yarmouth Water Co.
Supplies the village of Yarmouthville in the town of Yarmouth. The system was constructed in 1895. Secures water from springs. The water flows by gravity to a standpipe of 265,000 gal. capacity. The auxiliary supply is pumped by electric power from a river. Chlorinator installed September, 1920. Twenty miles of mains. Color 5. Hardness 44. Chlorides 7. Quality of water excellent.

Yarmouthville
See Yarmouth Water Co.

York Shore Water Co.
Supplies the town of York. Population 2,727. The works was constructed in 1896 and secures water from a lake. Thirty-five and one-half miles of mains. Color 18. Hardness 19. Chlorides 8. Water of excellent quality.

Growing Network of Airways Speeds Communication Between Many Cities


AIRWAY MAP OF THE UNITED STATES
Airway under mail contract
Airway under mail contract but not yet operating
Airway on which mail contracts are advertised or pending
Air may proposed
Army Airway
Private express route
TO MEXICO CITY
TO HAVANA

MAP ISSUED BY DEPARTMENT OF COMMERCE ON NOVEMBER 1, 1927, SHOWS MAIL AND ARMY AIRWAY ROUTES

Important Conference on Civil Aviation

THE Department of Commerce has arranged a conference in Washington for the week of December 5, to be attended by representatives of the various civil aviation activities in the United States. Two days will be devoted to changes and amendments in air commerce regulations, and one day each to aviation schools, airports, and departmental and other services. Miscellaneous matters brought up at the conference will also be discussed.

The session on airports will be of special interest to municipalities. Many questions have arisen concerning airport administration and management, field rules, etc. It is hoped the conference on this subject will develop certain standards that will be uniform throughout the United States. Suitable local control of aviation activities is of great importance in the general scheme of air commerce regulation. The proposed regulations for rating airports will also be presented for discussion.

The subject is one calling for the earnest consideration of city officials and others responsible for airport administration, managers and operators of airports, as well as officials and others contemplating the establishment of airports, or that have them in process of construction.

Pictures and Paragraphs from Near and Far

Tulsa's Airport Marker

AN airport marker visible for many miles in every direction, and unique among those of the nation, guides aviators to Tulsa, Okla. It is formed in the soil which covers the city's high-pressure water reservoir. The tank occupies the peak of a high hill in the outskirts of the city, and the marker was constructed by cutting the letters and arrow which form the design in the ground on top of the reservoir and filling them with chat, concreting over that, and painting with the whitest of white paint.

THE MARKER WHICH GUIDES AVIATORS TO THE AIRPORT IN TULSA, OKLA.

The letters of the word "Tulsa" are 24 feet high, 22 feet wide, and have 6 feet of space between them. The whole word is 157 feet long. Below the city's name there is a 150-foot arrow which points in the direction of the leading airport. The marker was designed by George L. Watkins, Water Commissioner, and was erected by the Tulsa Water Department as an undertaking of the municipality.

The scenic drive around the edge of the reservoir makes a large circle around the letters, and further draws attention to them.

N. S. IVES.

Extra-Curious Street-Marking in Yucatan

IN the strange little city of Merida, in the state of Yucatan, Mexico, there persists as curious a form of street-marking as any to be met with in the world.

Mexico, even now, is hardly overburdened with super-educated folk. In the early days, the percentage of illiterates in any Mexican city of size was greater still. Very few persons could read numbers or the letters of the alphabet. As a consequence, street names with letters, or numbers, needed to set them forth would have been very nearly useless to the citizens of those days.

The city fathers of Merida hit upon a something much more satisfactory: Each corner in the little city was marked with an image of an animal of familiar sort. There was the rabbit, the tiger, the elephant, the parrot, and so on, with all the variety a Noah's ark might afford. Persons recognized the figures upon sight. If they were puzzled, any child could set them right at once. The system served every purpose desired in finding one's way about.

Later, of course, street-naming was changed, so far as marking was concerned. Many streets have been numbered as well. But the people cling to the old names. They still set up the old signs, along with the new. So one has the corner of the Rabbit—Esquina del Conjeco—where one of the city's most popular caravansaries is doing business.

THE SIGN OF THE LION, MARKING A STREET IN MERIDA, YUCATAN, MEXICO

The streets having been numbered in sequence, the city fathers have gone farther still. All the east-and-west streets have even numbers; all the north-and-south streets are given odd numbers. The system proves one of the easiest for the stranger. It has been made compulsory for all cities of Yucatan.

FELIX J. KOCH.

An Architecturally Effective Water-Tank Treatment

THE extent to which the architectural unity of a real estate subdivision may be conserved and to which a purely utilitarian, and ordinarily unsightly, object may be made a unit of the scheme has been effectively demonstrated in the treatment of the elevated water-tank at the Will St. John and Co. development at Pearl Beach, Mich.

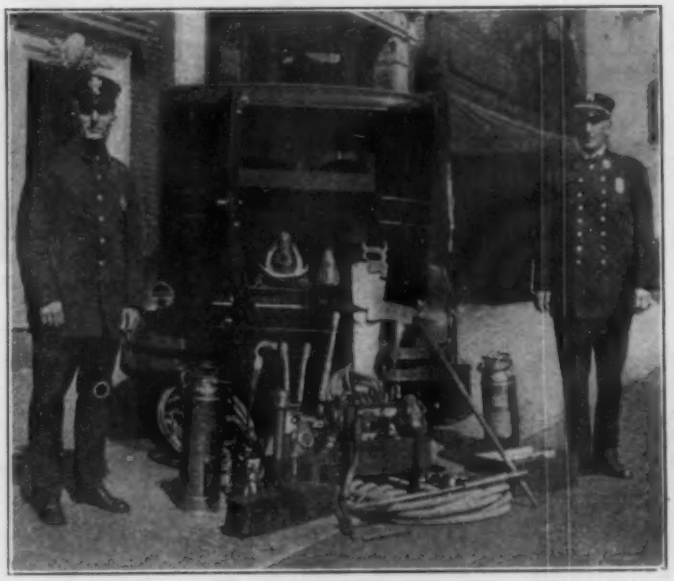
The architectural style prevailing throughout this new 2,400-acre development is to be Old English. The 60,000-gallon Horton steel tank, which ensures residents a gravity water-supply, has been placed at the entrance to the grounds where, by the ingenuity of the treatment which has been given it, it towers with the appearance of an oddly stylized Elizabethan lodge gate. The tank is enclosed in a cylindrical steel shell of 3/16-inch steel plate, and is surmounted by an appropriate ornamental roof. The shell extends from the balcony line to a 3½-foot masonry course at the base of the tank, designed to give the whole structure a symmetrical line. An ornamental doorway with a 2-inch, iron strapped plank door, and a vertical row of inset windows above it, complete the effect.

The covering around the tower and the tank shell are painted the same cream color as the other buildings of the development. A generous portion of sand was added to the last coat of paint to give the cover the appearance of masonry. The brackets under the masonry, the balcony, and the cornice of the roof are painted black. The steep-pitched roof is in keeping with other roofs on the property, even to being painted a bright red. The structure is surmounted by a powerful lamp which, acting as a beacon to water travelers, blinks out over the St. Clair River six times each minute.

AT THE ENTRANCE TO THE PEARL BEACH SUBDIVISION, WHERE OLD ENGLISH ARCHITECTURE IS TO PREVAIL, THIS DISGUISED WATER-TANK LOOMS UP WITH THE EFFECT OF A GIANT GATE-KEEPER'S LODGE

New Cars for District Fire Chiefs in Boston and Their Equipment

THE new Chandler automobiles for district fire chiefs in the Boston Fire Department are a special sedan model, and carry the following fire tools in the rear compartment: one Callahan door opener, one maul, one hack saw, one elevator jack, three elevator wedges, two jack-bars, three cold chisels, one crowbar, one pair of bolt and wire cutters, three hydrant wrenches, one life-line, one tow-line, six gas-masks, boxes, and canisters, six extra canisters, one pair of rubber gloves, one fire ax, two foam-type extinguishers, one blanket, one length of ¾-inch hose, one chemical play pipe, one set of keyhole saws, one carbide lamp, one rip-saw, one Pyrene extinguisher, one soda-and-acid extinguisher, one soda-and-acid recharge, one 2½- by ¾-inch reducer, one chemical hose spanner, and one duplex folding pail. Fire Commissioner Eugene C. Hultman and Chief Daniel F. Sennott believe these tools will prove an aid in emergencies that may come up in answering telephone alarms or in cases of delay.



NEW DISTRICT FIRE CHIEF'S CAR FOR BOSTON, MASS., FIRE DEPARTMENT
District Chief M. J. Teehan (at right) and driver

Boston's Tiny Fire-Boat for Fighting Fires Under Wharves

A recent addition to the marine equipment of the Boston, Mass., Fire Department is the small fire-boat shown in the accompanying photograph. The little boat is fitted with an Evinrude pump connected to a 2½-horsepower gasoline engine with an Evinrude outboard motor at the stern to propel the boat.

The outfit is intended for use in fighting fires under wharves and bridges, where the large steam fire-boats and land companies cannot reach.

NEW "PUP" FIRE-BOAT OF BOSTON'S FIRE DEPARTMENT

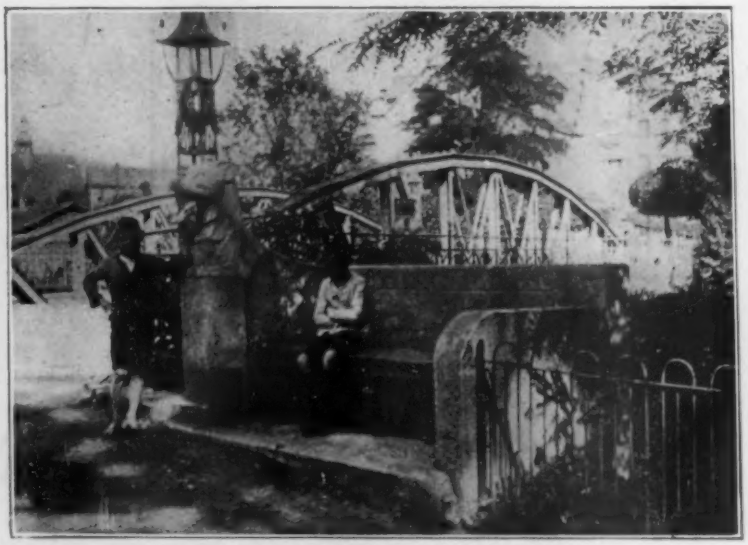
Practical Park Decoration in Coburg, Germany

WASTE paper baskets and cans are usually eyesores in public parks. A plan for disposing of waste paper and yet not having the public grounds disfigured by baskets has been put into operation in Coburg, Germany. A receptacle for waste matter has been provided in the end of a certain type of park settee, as shown in the picture. The lion's mouth is the opening for depositing refuse.

Copper Street Lamps for Berlin

COPPER has been brought into service to solve the problem of Berlin's rusting street lamps. According to the *Bulletin* of the Copper and Brass Research Association, the municipal authorities have discovered that the tin lanterns which have been in use do not long survive exposure to bad weather. Throughout the city new street lamps made of rustproof copper are being installed and will protect Berlin's lighting system permanently against defective service and fixtures that are unsightly, on account of rust.

RUST-PROOF STREET LAMP, BERLIN, GERMANY

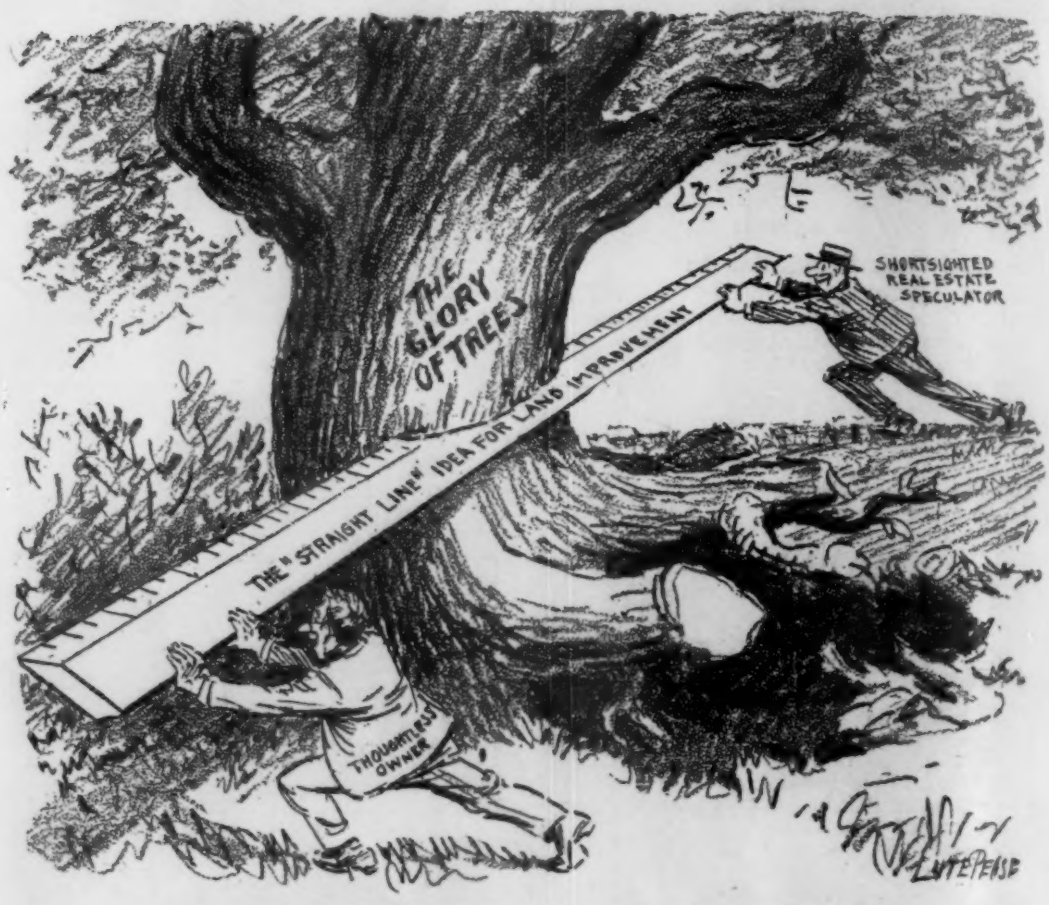


YOU PUT YOUR TRASH IN THE LION'S MOUTH

Photograph by courtesy of Graham Brothers

THE DEPARTMENT OF STREET RAILWAYS OF DETROIT OPERATES THIS PARLOR COACH FROM DETROIT HOTELS TO THE FORD AIRPORT, WHERE PASSENGERS BOARD AIR LINERS FOR AERIAL TOURS OR TRIPS TO OTHER CITIES

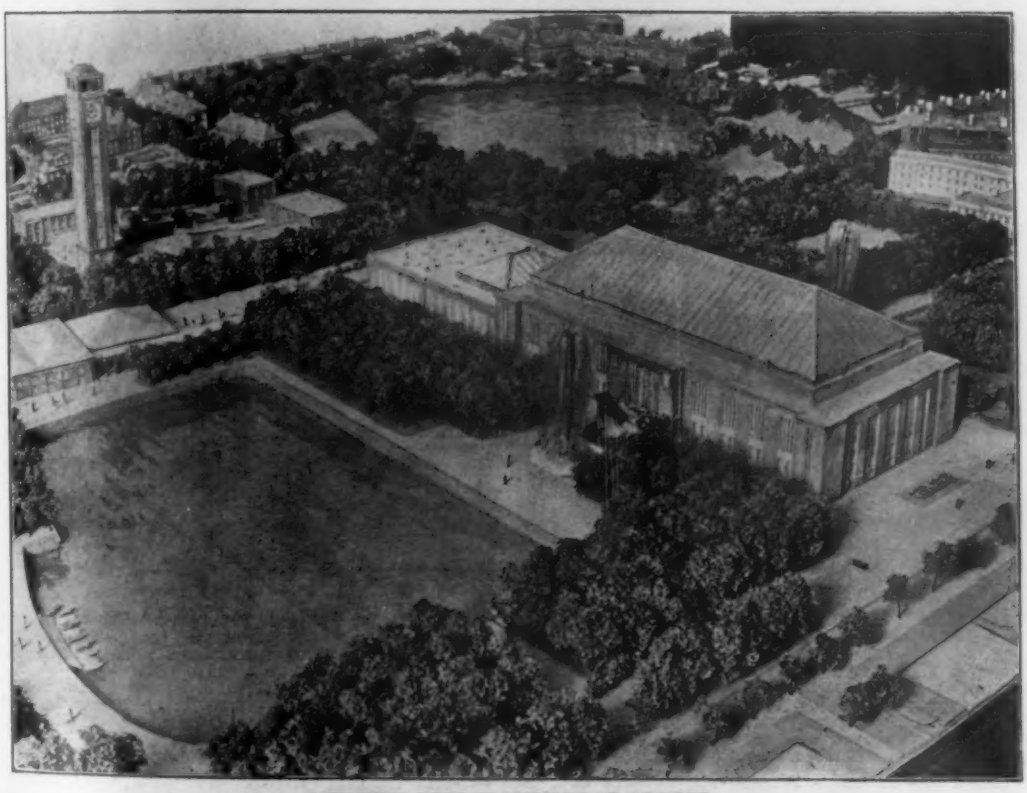
Regular two-hour coach service was instituted September 1, the fare being 25 cents each way



THE STRAIGHT LINE AND THE SHORT-SIGHTED LAND DEVELOPER

This "Save the Trees" cartoon by Lute Pease is reproduced by permission of the Newark (N. J.) Evening News

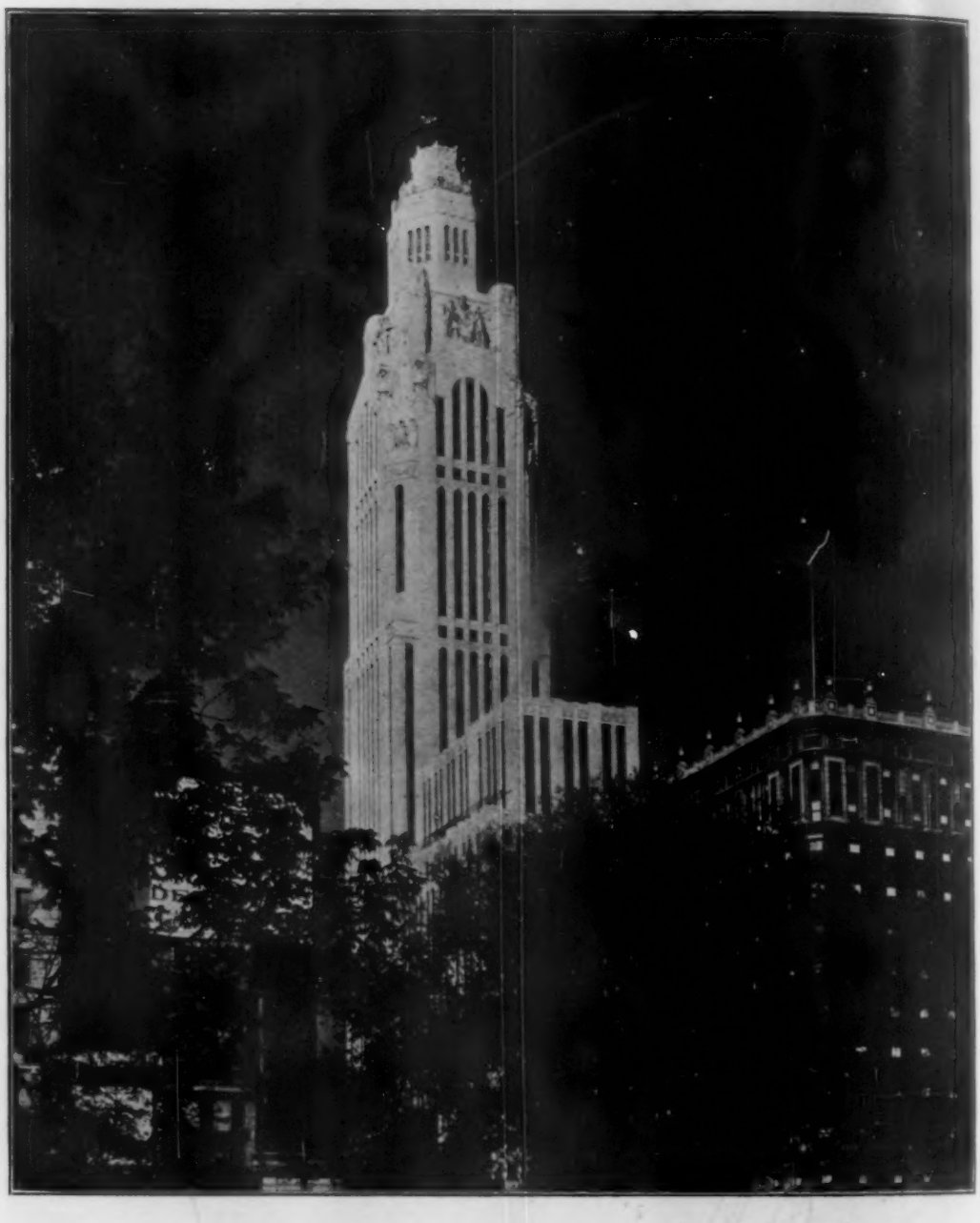
ONE OF AMERICA'S FINE MUNICIPAL SWIMMING POOLS



THE NEW BERLIN MUNICIPAL PLUNGE

The largest artificial pool in Continental Europe, accommodating 3,000 swimmers, is fed with sterilized water from an ice factory. Photograph from a model

Fire Department Pumper Tests in 555-Ft. Skyscraper



CHAMBER OF COMMERCE secretaries who visited Columbus for the NACOS convention a few weeks ago were thrilled with the beauty of the magnificent A. I. U. Building. They and other concerned with the safety of tall structures will be interested in recent pumper tests reported by H. J. Manning, Chief Engineer of the Ohio Inspection Bureau.

The first test consisted of a 1,000-gallon Seagrave pumper of the Columbus Fire Department (which has been in service for seven years), drafting from a city hydrant and connected through two 100-foot lines of 2½-inch hose to a siamese supplying a 6-inch inside standpipe riser to the 44th floor level. A 200-foot line of 2½-inch hose extended from this outlet to the balcony around the observation tower on the 46th floor level. Size of tip used, 1⅛ inches. The engine was operated at about half throttle, in compliance with the building management's request that pressures at lower level be maintained below 400 pounds.

The second test consisted of a new Seagrave 400-gallon "Suburbanite," drafting from a city hydrant and pumping into a standpipe siamese. Inside hose layout same as above. Size of tip, ⅞-inch.

The figures of the two tests were:

	Test No. 1	Test No. 2
Hydrant pressure (static)	65 lbs.	65 lbs.
" " (residual)	62 "	64 "
Pump pressure	380 "	358 "
" " net	318 "	294 "
Delivery in gallons per minute	353 "	238 "

Municipal Accounting and Finance

Conducted by Francis Oakey, C. P. A.

Member of the Firm of Searle, Oakey & Miller, New York

The Foundations of a City Accounting System

ACCOUNTING is the science of producing and conveying the information which is needed as a basis of the management of finances. The production of facts relating to financial condition and financial operations is the main function of all accounting. The test of sound accounting is whether the facts produced convey information on which decisions can be reached and action taken in respect to those questions of financial management which must be settled.

It follows, therefore, that in order to determine what should be the foundations and main structure of the accounting system of a city, the first step is to answer the question: What information is needed to administer effectively the finances of a city?

Obviously, an intelligent attempt to answer this question must be based on a recognition of the several functions which must be performed in the administration of municipal finances. These functions consist of two main groups, namely:

1. The making of the budget
2. The execution of the budget

The Information Needed by the Departmental Head in Making and Executing the Budget

The making of the budget is a continuous process. The financial administrator and the departmental head must plan continually; it is in their brains and those of their subordinates that the process of formulating the budget begins. The defects, inadequacies and superfluities of the existing budget plan are discovered in the attempt to carry it out. The budget estimates submitted by the departmental executive are the result of modifications of the previous budget which he considers necessary in the light of his recent experience. His problem is to design a program of work to be done, to perform and to maintain in a state of sufficiency the service which are essential. To do this he must first define the processes and jobs required to perform each function. In respect to each process and job he must then make estimates of five classes, namely:

1. The number and salary cost of the employees of each class and grade required to do the work
2. The quantity and cost of each kind and grade of supply and material required
3. The quantity, extent or scope and the cost of each kind of contractual service required
4. The capacity and cost of each kind, type and grade of equipment required
5. The amount and cost of each type of building space required

In order to arrive at his conclusions and to justify them, the information he needs clearly consists of the following classes:

1. The amount which it has cost to perform each function, process, project or job for which his department is responsible
2. The quantity and cost of the labor of the services and of each item of materials and supplies expended or consumed in performing each function, process, project or job
3. The volume of work done or service rendered through each function, by each process or on each job or project, and the unit cost thereof
4. The capacity of the buildings occupied and the equipment used in rendering the services
5. The condition of appropriations granted or of funds established for meeting the cost of performing the functions of his department, or of constructing or acquiring permanent property

To produce this information six classes of accounting records are required, namely:

1. Expenditure accounts classified according to departments, bureaus, divisions or other distinct units of organization, and showing for each unit detailed analyses, namely:
   (a) The cost of each process or job carried on or done in each unit of organization
   (b) The cost of each class of labor, each kind of contractual service, and each class or kind of supply or material applied to or consumed in performing each process or doing each job
2. Production records showing the volume of work done or service rendered in all processes performed or jobs done in respect to which the volume can be measured
3. Inventory records of stores received, issued and on hand, based on a standard classification and nomenclature
4. Personnel records showing all the required details in relation to employees

5. Equipment records showing all essential facts respecting the class, kind, type, grade, age, condition, capacity, and cost of equipment on hand and available for use
6. Accounts of appropriations granted and special funds established to support each department, function or activity or to provide for the construction or acquisition of public works

Each department responsible for accruing, billing and collecting special revenues connected with, or arising from, its operations must keep, in addition to the six classes of records enumerated, detailed records showing in chronological order the items accrued or collected, the names of the debtors or payors, and the total derived from each main source or class.

The Information Needed Respecting General Revenues in Making and Executing the Budget

The most common cause of a deficit is failure to collect the amount of revenue estimated in the budget, accompanied by ignorance of the growing deficiency. Departmental heads will spend the amounts of appropriations granted to them. Consequently, since the aggregate of these grants equals or closely approximates the total estimated revenues, a deficit will result if the estimated revenues are not collected in full. It is not always possible to estimate accurately the amount of revenues which will be collected. But it is possible by means of accounts to know from month to month whether collections are up to the schedule required to reach the estimated total at the end of the year. With this knowledge, action can be taken to stimulate collections and to reduce expendiures below the amounts of the appropriations granted.

This is the work of the chief executive or of his lieutenants, the budget director or sometimes the comptroller or auditor. It is work which requires two classes of information, namely:

1. The amount of each class or kind of revenue collected to date, compared with the budget estimate thereof
2. The total expenditure to date under each appropriation related to the amount of the appropriation and considered in the light of any regular seasonal activity or any unusual conditions

Controlling the Accrual and Collection of Revenues

Of all the information respecting revenues, that relating to taxes is by far the most important for the following reasons:

1. Taxes constitute most of the revenue, often amounting to 80 per cent of the total from all sources. Therefore, an underestimate in the budget of the anticipated percentage of uncollectible taxes means a proportionately large deficiency which must be off-set by an increase in miscellaneous revenues or a reduction in expenditures
2. Laxity in collection of taxes is a common defect

In order to supply the essential information, accounts and records must be kept to show in respect to each class of taxes:

1. The total amount assessed for the year
2. The total amount abated to date, the details thereof and reasons therefor
3. The total amount collected each day and for each month and for the whole elapsed period of the year to date and the uncollected balance
4. The amount of delinquent taxes of prior years collected
5. The amount of delinquent taxes placed in the hands of the City Attorney for collection, and the amount collected to date as a result of his action

The accounts which are required to produce this information are of two classes, namely:

1. Controlling accounts kept by the Comptroller or City Auditor
2. Detailed accounts and records kept by the tax collector

Controlling Accounts for Taxes

Taxes are a class of revenue which is peculiarly susceptible to an effective accounting and auditing control. There are two main reasons for this. First, the amounts of taxes to be collected are definitely determined in advance of collection by the process of assessment and levy. Second, the several processes required to bring taxes into the treasury are performed respectively by several distinct and independent officers or groups of officers, which fixes responsibility and lays the foundation for a check upon accountability. For example, a common distribution of these responsibilities is as follows: The amounts of assessments are determined by tax assessors, reviewed and adjusted by a board of apportionment, confirmed in total and the tax rate fixed by the board of aldermen, and billed and collected by the tax collector on the basis of a certified tax roll. Penalties, at fixed percentages, are imposed in accordance with law by the tax collector and added to the unpaid items. Finally, delinquent taxes are, after a specified date, commonly turned over to the city attorney for action. Accounts designed to control the accrual and collection of taxes can be set up on the books of the city auditor. These accounts are debited with the total taxes as shown by the certified roll and credited with the total collections reported by the tax collector and turned over to the treasurer. Thus, the balances show the amounts which it is the duty of the tax collector to collect, and provide

a basis for proving his records in the audit of his accounts.

The Accounts of the Tax Collector

The tax collector is supplied with a certified roll of the taxes which it is his duty to collect. He must keep a detailed, chronological record of collections and record each taxpayer's payment against his name on the roll. Thus, the open items on the roll should represent the unpaid taxes and should agree in aggregate with the controlling accounts in the auditor's general ledger. At the required dates the amounts of penalties must be calculated and entered against each taxpayer's name on the roll and added to the tax, and the aggregate of these penalties must be reported to the city auditor so that he may include them in his controlling accounts.

The tax collector must also keep a daily proof of his cash and a clear record of all settlements with the city treasurer. A copy of this proof must be delivered to the City Auditor for entry in the controlling accounts.

The Accounts of the City Treasurer

The treasurer is the receiving and disbursing officer of the city's moneys and the custodian of the city's cash balances. Consequently, he must keep records of cash receipts and disbursements in detail, and a daily proof which will show the total cash balance of the city for which he is responsible. He must also keep an account with each bank in which the city's cash is deposited. In his record of cash receipts and disbursements and in his proof he must distinguish between the general fund, special funds, and bond funds. If he is custodian of the sinking-fund and of any trust or private funds, he must keep separate and distinct accounts therefor and separate records of receipts and disbursements. Finally, he should report a summary of his transactions and balances daily to the city auditor to enable the latter to post the totals of the cash transactions to the controlling or general accounts of the city.

The Accounts of the Auditor

In addition to the controlling accounts for taxes and cash, the auditor should keep accounts of the other resources and of the liabilities, expenses and revenues of the city. His general ledger should include at least the following accounts:

RESOURCES:
- Cash in the Treasury
- Taxes Receivable
- Assessments Receivable
- Miscellaneous Accounts Receivable
- Stores
- Resources for the Redemption of Debt—
  - Sinking-Fund
  - Amount to Be Raised by Taxation to Redeem Debt
- Expenses
- Permanent Property Controlling Account

LIABILITIES:
- Warrants Payable
- Temporary Loans
- Reserve for Uncollectible Taxes
- Funded Debt
- Revenues
- Current Surplus (Unexpended Revenues)
- Reserve for Bond Fund Cash Unexpended
- Permanent Property Balancing Account

In support of these controlling accounts the auditor should keep detailed accounts in subsidiary ledgers as follows:

- Taxes Receivable (an account for each class of tax and for each year)
- Assessments Receivable (an account for each project)
- Miscellaneous Accounts Receivable (an account for each debtor)
- Stores (at least an account for each department)
- Expenses (a detailed classification for each department)
- Permanent Property (at least an account for each department)
- Funded Debt (a record showing the details of each loan)
- Revenues (a detailed classification)

The details relating to Cash, Sinking-Fund, Warrants Payable, and Temporary Loans would be shown in the treasurer's records. The details of Stores and Permanent Property would be shown in records kept by the several operating departments.

In addition, the auditor must keep detailed accounts of appropriations and funds, showing the condition and operations of each. In relation to these accounts, a file of unfilled purchase orders and uncompleted contracts must be maintained so that the unencumbered balance of each appropriation and fund may be determined.

Financial Statements

It should be the duty of the City Auditor to prepare the statements which are required in the administration of the city's finances. These statements are those which convey the information needed to formulate and execute the programs of expenditure and of financing, namely:

1. A summary statement of expenditures and means of financing, showing actual figures compared with the budget estimates. This summary should be supported by detailed schedules.
2. A statement of the condition of appropriations and funds.
3. Statements of the operations of funds.

4. A statement of the particulars of the debt.
5. A statement of the condition of the Sinking-Fund.
6. A current balance sheet.
7. A statement showing those physical particulars of property (buildings, equipment, etc.), which bear upon questions of its capacity and availability for service.

Care should be taken to exclude statements or details which have no direct bearing upon the problems of formulating and executing the programs of expenditure and financing. To all statements, details of statements and all accounts, the test of sound accounting and reporting should be applied, which is this question:

Does the statement, item or account convey information on which decision can be reached and action taken in respect to those questions which must be settled to administer effectively the finances of the city?

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The City's Legal Rights and Duties

Conducted by A. L. H. Street, Attorney at Law

City Was Not Liable for Flooding of a Basement Caused by Breaking of a Water-Main

Even if negligence of an employee of a city caused bursting of a water-main and consequent flooding of a merchant's basement, the city would not be liable for injury to goods in the basement, because of the general immunity of municipal corporations for wrongs committed in the exercise of governmental functions. It was so decided by the North Carolina Supreme Court in the case of Parks-Belk Co. vs. City of Concord, 138 South Eastern Reporter, 599. Incidentally the Court decided that the evidence failed to show that the employees of the city unduly delayed stopping the flow of water after the main burst.

The Revoking of a Building Permit, Being a Governmental Act, Does Not Make the City Liable in Damages

The city of Toledo, Ohio, issued a building permit to one James to construct a dwelling-house. After the work had been commenced and considerable expense incurred, the city revoked the permit under the prospect of condemning the lot for street purposes. The condemnation proceedings were dropped, and suit against the city for damages resulting from revocation of the permit and refusal to reinstate it followed.

The Court of Appeals for Lucas County decided (157 North Eastern Reporter, 309) that the city had acted in a governmental capacity and was therefore not subject to the suit for damages. It was intimated that plaintiff's only redress was a mandamus proceeding to compel reissue of the permit.

City Liable for Death of Employee Caused by Defective Electric Light Standard

A lineman in the employ of the city of Galveston was fatally injured through the falling of an electric light standard that had badly rusted at the base. The standard was part of the equipment used in lighting a roadway along a sea-wall. The city unsuccessfully resisted a suit for damages, claiming that it was immune from responsibility because the accident occurred in the course of the exercise of the city's governmental functions. The United States Circuit Court of Appeals, Fifth Circuit, said (City of Galveston vs. Rowan, 20 Federal Reporter, 2d Series, 501):

"The city of Galveston, under its charter rights to provide for and regulate the lighting of its streets, had the implied power to operate an electric plant with a system of poles and wires, or to operate the transmission system with power secured by purchase. In doing so, it was not exercising a governmental function, and was responsible to its employees engaged in that particular branch of service for damages caused by negligence or breach of duty."

Private Property Cannot Be Condemned for Private Use

Where it appeared that the defendant city was attempting to condemn a triangular piece of ground along a boulevard, to afford another private landowner better access to the boulevard, the Indiana Supreme Court decided that the condemnation proceedings should be enjoined. The court said (Kessler vs. City of Indianapolis, 157 North Eastern Reporter, 547):

"The taking of private property for a private use violates the constitutional rights of the owner. . . . On the other hand, a use which is in itself of a public character justifying the exercise of the power of eminent domain does not lose its character as such by the fact that the exercise of the power for such use will incidentally result in a private use or benefit."

Owner's Remedy Where Tract Is Included in, But Not Benefied by Special Improvement

The organization of a sewer district in a Kansas city of the third class was not vitiated because a considerable number of unimproved town lots facing upon a platted but unopened and unused public street, all belonging to one owner, who could not afford to pay the sewer assessments, was not included within the limits of the sewer district, nor because some of the members of the city government held the debatable view of the law that in the future when those vacant lots were sold for homesites they could then be included in the district and subjected to assessment.

Where a tract of property incuded in a special improvement district will not be benefited by the improvement, the owner's recourse is not a suit to enjoin the entire improvement, but to enjoin assessment of his property. (Botts vs. City of Valley Center, 257 Pacific Reporter, 226, decided by the Kansas Supreme Court.)

City May Require Street-Railway Company to Relocate Its Tracks and Poles

Holding that defendant street-railway company could be compelled to relocate its tracks and trolley-poles to conform to the center line of a street as widened, the Illinois Supreme Court said in the case of People vs. Chicago City Railway Company, 155 North Eastern Reporter, 781:

"A street railway acquires no interest or estate in the soil by laying its rails on the streets under an ordinance permitting it. The grant made by the city is merely a license to the railway company to construct and operate its road upon certain streets, . . . which becomes a contract when it is accepted and acted upon in a substantial manner. . . . .

"In so far as the contract between the city and railway company relates to matters which do not affect the public safety, welfare, comfort or convenience, the constitutional prohibition against impairing the obligation of a contract applies, but where, under the police power, the city directs some improvement to be made by the railway company which will promote the public safety, welfare, comfort, or convenience, no contractual obligation of the city is impaired, because the city has no power to surrender any of the police powers delegated to it by the legislature. . . .

"The license under which the railway company constructs, maintains, and operates its railroad was granted and accepted subject to a reserved police power on the part of the city to regulate the use and enjoyment by the railway company of the street in such manner as the public convenience or safety at any time might require. . . . The permission given a railway company to use the streets of a city is in subordination to the general power of the municipality over its streets.

"The city is under no obligation to conform its treatment of its streets to the construction of the company's roadbed, but, on the contrary, the company must conform the construction of its roadbed to such reasonable regulations as are made by the municipality in the reasonable exercise of its powers concerning the use, control, regulation, and improvement of its streets. Street railways occupy public streets subject to the use of such streets by the public, subject to such burdens as may be made necessary by reason of the improvement of such streets, and subject to such changes in the construction of roadbeds as improved and changed conditions may demand."

Patented Material, Where Superior, May Be Specified for Municipal Improvement

A Kentucky city's paving contract was not rendered invalid because it required use of rock asphalt that was produced by but one company, where that company was not engaged in the construction business and there was no impairment of competition as between the bidding contractors. But, in reaching this conclusion in the case of City of Springfield vs. Haydon, 228 South Western Reporter, 337, the Court of Appeals for the commonwealth notes that the courts throughout the country are not in harmony on the point as to whether a patented or otherwise monopolized product legally may be specified for public work. The Court makes this quotation from a legal authority as to the ground upon which the practice is regarded as being sustainable:

"It would bring about a harmful result which the Legislature cannot be supposed to have intended if the public should in effect be barred from taking advantage of recent inventions or obtaining beneficial improvements because they were covered by an authorized patent, or were the product of an exclusive manufacture, and the producer did not find it necessary to underbid his less well-equipped competitors, and it is accordingly held that an advertisement may lawfully specify an article covered by a patent or a trade-name, if the article is different from other products, and may fairly be considered superior in quality."

A Railroad Company Can Grant Exclusive Taxicab Privileges Upon Its Own Premises

Railroads operating a union passenger station in Cedar Rapids, Iowa, granted plaintiff, a taxicab company, an exclusive stand on its premises under such conditions as to favor that company in securing patronage from incoming and outgoing passengers. Defendants questioned the right of the railroads to grant such preferential privilege. That is how the case of Red Top Cab Co. vs. McClashing, 213 North Western Reporter, 791, happened to come before the Iowa Supreme Court.

Defendants contended that the railroad companies' duty to the public forbade that they grant a monopoly to plaintiff. But the Court said.

"A railroad company as a common carrier may not discriminate between patrons or grant one or one class advantages over others. The defendants, however, are not patrons of the railroad companies, and are not demanding the service for the performance of which the [railroad] companies were created, and which they are required to render to all members of the public alike. The defendants have no standing to set up the right of patrons. The carrier performs its duty to its patrons when it affords reasonable and proper means of access and exit to and from its premises without preference or discrimination. It is not required to look after their transportation to or from its premises.

"There is no reason why a railroad company should be denied the right to contract with whomsoever it chooses for the private use of its premises when such use will not conflict with the performance of its public duties."

City Not Liable for Drowning of a Child in a Swimming Pool in a City Park

In the recent case of Mocha vs. City of Cedar Rapids, 214 North Western Reporter, 587, suit was unsuccessfully brought against the city on account of death of a boy who drowned in a hole in a swimming pool in one of the city parks. The Iowa Supreme Court said:

"It is not shown, and we cannot presume, that the nominal charge of 10 cents for the use of the bathhouse, locker, and towel, as well as for the use of the beach, was for the purpose of, or resulted in, any profit to the city, or that the establishment and maintenance of the beach was a business undertaking. . . . A bathing beach is a general public benefit. Its maintenance is in the interest of all. It affords the public, especially the young, the means of healthy recreation and athletic exercise. It is not of the nature of a corporate or business undertaking for the corporate benefit, or in the corporate interest. In the maintenance of the bathing beach the city or its officers were rendering a public service, and performing one of the functions of government."

A Fire Hazard Ordinance Held by Its Terms to Be Unreasonable and Void

An ordinance of the city of Sidney, Mont., was declared to be unconstitutional for unreasonableness in the case of Bettey vs. City of Sidney, 257 Pacific Reporter, 1007. In the course of its opinion the Court said:

"The cases hold without exception, so far as we are aware, that minor repairs upon wooden buildings cannot be prohibited. As to major repairs, those which amount to a large percentage of the value of the buildings, the authorities are not altogether in harmony. . . .

"A distinction is made between repairs upon buildings lawfully erected before inclusion within the fire limits and those created thereafter. Those who erect buildings within a fire district must be held to have done so in contemplation of ordinances governing the same. . . .

"But even as to buildings lawfully erected and existing when included within the fire limits, it may not be doubted that cities may exercise a reasonable control over the making of repairs, and may prevent repairs which will increase fire hazards or create nuisances. But an ordinance which arbitrarily deprives the city council of the right to exercise its discretion in granting the owner of the building the right to repair if it has been damaged to exceed a certain percentage of its value, unless the loss is so great as to require a practical reconstruction of the building, is not reasonable. The municipality may require the property owner to obtain a permit before proceeding with his repairs. It may prescribe reasonable regulations as to how the repairs shall be made and within reasonable limitations the character of the material which shall be used. It may fix a point at which the council in its discretion may reasonably refuse to grant a permit for the repair. But it is a fallacious notion that a building, not so seriously damaged that its repair will entail practical reconstruction, may be doomed to go to rack and ruin, thus becoming a nuisance. . . .

"The ordinance at bar does not base its percentage upon the true value of the building but upon its value 'according to the last assessment roll of the county of Richmond.' That an assessment roll is not a true criterion of value everybody knows. In this case it is admitted that the actual value of the property is $4,200, while the assessed value is $1,800. This ordinance arbitrarily denies to the city council the right to exercise its discretion in the matter of issuing a permit where the damage is 35 per cent of the assessed value. Clearly the ordinance upon this feature is arbitrary and unreasonable."

The Municipal Bond Market

By Sanders Shanks, Jr.

Editor, *The Bond Buyer*

THE fact that one-half of the issues listed in the appended tabulation were sold at prices which bring the net interest cost of the loans down to less than 4 per cent, illustrates nicely the steady advance in the market value of municipal loans. With the exception of the U. S. Government, no other class of borrower is in a position to obtain such cheap accommodation in the money market as the American state or city.

The trend of bond prices is, at all times, of interest to the officers of a municipality contemplating the issuance of additional bonds. At this time, in view of the substantial advance recently made in bond values, the city treasurer or comptroller is tempted to market his authorized bond issue, whether the funds are actually needed or not, in order to take advantage of comparatively attractive bond prices. It does not necessarily follow, however, that the advance is complete. In fact, it is the consensus of opinion among investment banking experts that a further fall in interest rates, which means a rise in bond prices, is inevitable in view of the great plethora of money and the inadequacy of available investment opportunities.

When it is realized that high-grade railroad bonds are selling on a 4 per cent interest basis, that the best public utility loans yield the investor less than 4½ per cent, that the U. S. Government's credit is now on a 3¼ per cent basis, it is apparent that high-grade state and municipal loans are, if anything, selling at less than their intrinsic worth. Were it not for the fact that there is a huge and continuous supply of new municipals coming on the market, whereas the supply of Government and first-grade railroad bonds is actually being reduced, municipal bonds would undoubtedly sell at relatively and substantially higher price levels.

The following table of representative issues, sold during the first part of November, indicates the present level of the municipal market:

Amount	Issue	Rate %	Maturity	Net Yield
1,000,000	Massachusetts ...	3½ & 4	1-15 & 16-20 Ser.	3.60
52,200	Clay Co., Ind....	4¼	8¾ Yr. Avg.	3.77
250,000	Lafayette, Ind., Sch. Dist.	4½	14 5/6 Yr. Avg.	3.82
105,000	Allen Co., Ind...	4¼	1-20 Yr. Ser.	3.85
550,000	Savannah, Ga....	4½	5¾ Yr. Avg.	3.96
2,500,000	California	4	14 Yr. Avg.	3.96
1,951,000	Grand Rapids, Mich.	4	1-5 & 1-10 Yr. Ser.	3.97
239,282	Peekskill, N. Y..	4	10 1/3 Yr. Avg.	3.99
3,000,000	Chicago, Ill., So. Park Dist.....	4	10¼ Yr. Avg.	4.01
39,000	Putnam Co., N.Y.	4¼	10 Yr. Avg.	4.04
275,000	Hazleton, Pa., Sch. Dist.....	4¼	9¾ Yr. Avg.	4.05
63,000	Winnetka, Ill....	4	4 1/6 Opt. Avg.	4.06
650,000	Oyster Bay, N.Y., Union Free Sch. Dist.	4¼	2-27 Yr. Ser.	4.07
150,000	St. Joseph, Mo...	4¼ &4½	13 1/3&14½ Yr. Av.	4.11
3,000,000	Arkansas	4¼	16 1/3 Yr. Avg.	4.21
115,700	Wyandotte Co., Kans.	4½	8 1/6 Yr. Avg.	4.25
100,000	Fort Thomas, Ky.	4¾	12½ Yr. Avg.	4.41
173,000	Wildwood, N. J..	5	7¼ Yr. Avg.	4.79
80,000	Warren Tp., Mich., Sch. Dist. No. 2...	5	21 Yr. Avg.	4.89

Zoning Notes

Prepared by Frank B. Williams

Author of "The Law of City Planning and Zoning"

From data collected by the Zoning Committee of New York (233 Broadway)

Recent Zoning Ordinances

MERIDEN, CONN.—October 3, 1927.
CENTRE ISLAND, N. Y.—July 6, 1926.
POUGHKEEPSIE, N. Y.—August 1, 1927.
WHITE PLAINS, N. Y.—May 9, 1927.

Recent Zoning Decisions

ILLINOIS.—*Minkus v. Pond*, 158 N. E. Rep. 121. An amendment of a zoning ordinance expanding a single-family residential district so as to include certain vacant territory, is not an unfair or unreasonable exercise of the city council's discretion.

It is primarily the province of the municipal body to which the zoning function is committed, to draw the line of demarkation as to use and purpose to which property shall be put, and it is neither the province nor the duty of the courts to interfere with such body's discretion, in the absence of clear showing of abuse.

Where it is fairly debatable whether the city zoning ordinance was reasonable, the court will not substitute its judgment for that of the city council.

NEW JERSEY.—*Karke Realty Associates v. The Mayor, etc., of Jersey City*, 5 N. J. Advance Rep. 1512. Appeal from Supreme Court to Court of Errors and Appeals. The plaintiff applied to the Commissioners of the city for a permit allowing the erection of a building of stores with apartments above them. The application was denied on the ground that it was contrary to the zoning ordinance of the city to grant it. The plaintiff applied to the Supreme Court for a writ of peremptory mandamus for the granting of the permit, and obtained judgment therefor, on the authority of the Nutley case. The ordinance was passed prior to the passage of the zoning amendment to the state constitution. The Court of Errors and Appeals sustained the judgment of the lower court.

In accord; *Township of Maplewood v. Margolis*, 5 N. J. Advance Rep. 1495; *Margolis v. Township of Maplewood*, ib. p. 1530; *Robert Realty Co. v. City of Orange*, ib. p. 1514.

NEW JERSEY.—*State ex rel. Savitz-Denbigh Co. v. Bigelow*, 5 N. J. Advance Rep. 533. A zoning ordinance forbidding the erection of motor-vehicle service stations within a specified distance of a public school, church, etc., is valid. The distance is to be measured from the nearest part of the school, etc., and not from that of the lot upon which it is situated.

NEW YORK.—*Matter of Calton Court, Inc., v. Switzer*, 221 App. Div. 799. Appeal from a peremptory mandamus order directing the building inspector of the city of New Rochelle to issue a permit for the erection of an apartment house in accordance with plans duly filed. The neglect or refusal of the inspector to act was for the purpose of enabling the Common council of the city to change the zoning ordinance so as to prohibit the erection of the apartment house on the lot in question; and such change was made. Held that the order of mandamus be affirmed.

NEW YORK.—*Matter of Oppenheimer v. Kraus*, 221 App. Div. 773. The prohibition in a zoning ordinance of any structure to be used for business unless it "has a frontage of at least 20 feet and a depth of at least 50 feet, and if the structure consists of only a ground floor then and in that event the ceiling must be at least 10 feet in height from the floor and the cornice must be at least 16 feet from the pavement," is arbitrary and unreasonable. It does not serve a purpose either useful or esthetic, nor does it in any way promote the public health or safety or the general prosperity.

NEW YORK.—*Matter of Pelham View Apartments, Inc., v. Switzer*, 130 Misc. 545. The petitioner, relying in good faith upon a permit duly issued, purchased the real property in question, paying a substantial sum down, employed an architect who prepared and filed the plans, paid additional sums on account of the purchase price, took title, executed a purchase-money bond and mortgage, had the land surveyed, and excavated the cellar at an expense of approximately $1,000. Thereafter the zoning ordinance of the city was amended and for that reason the permit was revoked. Held that it was beyond the power of the Common Council to amend the zoning ordinance so as to invalidate and of the inspector to revoke the permit, the petitioner having vested property rights protected by the federal and state constitutions.

NOTE BY EDITOR.—*The cases have not heretofore gone so far as to hold that there is in such cases a vested property right against the exercise of the police power, although they do decide that a permit cannot be validly revoked.*

The California Planning Act of 1927 is a notable achievement, made generally useful by its issue in book form with helpful notes and references by Charles Henry Cheney, Secretary of the California Conference and member of the American City Planning Institute. Our readers will remember that recently the Department of Commerce at Washington prepared a Standard City Planning Act intended to embody the best thought of the country on the appointment and duties of planning commissions, the preparation and adoption of official city and regional plans, and platting. In using this act as a model, California has given this country an example of its wisdom. In the future no state will have an excuse for crude legislation on this subject. The California law does not follow the Standard Act slavishly. On some doubtful points it has adopted methods of its own. In some respects also it has followed the recent legislation in New York, prepared with the assistance of the Regional Plan of New York and Its Environs. On these and other points there will, of course, be differences of opinion. Only experience and the interpretation which the courts give to laws on this subject in this country, can enable us to tell which of these laws is the wisest; and they will doubtless lead us to try means of accomplishing our ends, not yet formulated. This is all as it should be. And in the progress which is coming so rapidly in this branch of the law the California statute is a most important one. 67 pp. $1.50. (Apply to Mr. Cheney, Palos Verdes Estates, Calif.)

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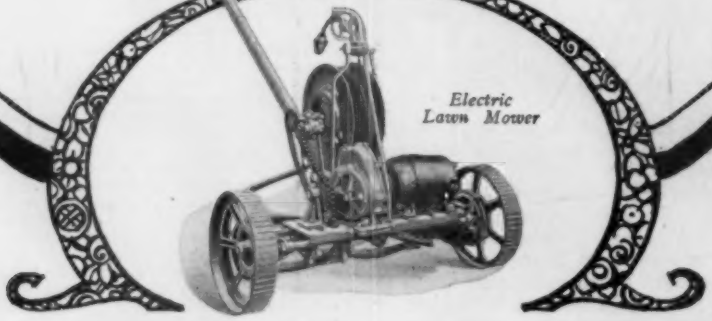

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Municipal and Civic Publications

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Principles of Real Estate Appraising.—By John A. Zangerle. The Stanley McMichael Publishing Organization, Cleveland, Ohio. Second edition, 1927. 443 pp. $5.00.

Mr. Zangerle has achieved a nation-wide reputation in real-estate appraising during his long experience in Cleveland as auditor and assessor for Cuyahoga County, and his book is a recognized authority. This is an enlarged and revised edition. Three new chapters, entitled "Unscientific Bond Issue Appraisals," "Legal Decisions Regarding Appraisals," and "Sensing the Market," have been added, and the length of treatment of the following subjects has been increased: plottage value; effect of auto transportation; store rental capitalization; corner lots; rate of capitalization; rent in relation to gross sales; effect of re-appraisal leases on land values; the capitalization of 99-year lease rentals; depreciation and appreciation.

Public Welfare Administration in the United States.—By Sophonisba P. Breckenridge, Professor of Social Economy, University of Chicago. The University of Chicago Press, Chicago, Ill. 1927. XXIII + 786 pp. $4.50.

This is a collection of select documents, grouped in three chronological periods: prior to 1863, when the first board of state charities was created; 1863 to 1917, when the first state department of public welfare was established; and from 1917 to 1927. They are also broadly grouped according to briefer phases of the public welfare movement and to some extent according to special problems and jurisdictions. Public welfare work in cities receives its chief treatment in a section of 46 pages entitled "The Central Authority and the City." The materials included illustrate the intricacies and difficulties of public welfare activity and organization, and, according to the author, indicate the great amount of work yet to be done before a really comprehensive treatise on the subject can be prepared. Some papers, addresses and articles from periodicals are included, but the bulk of the contents consists of official documents. The materials have been tested for the past five years in the Graduate School of Social Service Administration of the University of Chicago.

Reports of the Detroit Bureau of Governmental Research.—A list of the reports, memoranda, and publications of this Bureau, from March 22, 1916, to September 30, 1927, constituting the October 15, 1927, number of *Public Business*. The list, which covers 12 pages, is arranged by topics. (Apply to the Bureau, 51 Warren Avenue West, Detroit, Mich.)

"Where Play?"—A 4-page folder of the Department of Playground and Recreation of Los Angeles, Calif., describing the various means of recreation available in or about that city after working hours. (Apply to the Department.)

Public Library Branches in Public School Buildings.—A 46-page mimeographed booklet of the Education Committee of the City Club of Chicago, favoring the utilization of appropriate public-school buildings for public-library branches to serve both school and community. Nation-wide data and statements of experts are given. (Apply to the Committee, Plymouth Court, Chicago, Ill.)

Smoke Abatement Methods used in Cleveland.—An article by Elliott R. Whitlock, Commissioner of Smoke Inspection, Cleveland, Ohio, in the October number of *Mechanical Engineering*. Several charts and other illustrations are given. 5 pages. 60 cents. (Apply to *Mechanical Engineering*, 29 West 39th Street, New York.)

School Fires.—The October, 1927, *Quarterly* of the National Fire Protection Association devotes 49 pages to this subject, describing six famous school fires where 353 deaths occurred, and giving data on loss of life and other elements in the record of school fires. (Apply to the Association, 40 Central Street, Boston, Mass.)

The Microscopy of Drinking Water.—By George Chandler Whipple, late Professor of Sanitary Engineering, Harvard University; revised by Gordon M. Fair, Assistant Professor of Sanitary Engineering, and Melville C. Whipple, Assistant Professor of Sanitary Chemistry, at Harvard University. Fourth Edition. John Wiley & Sons, Inc., New York. 1927. XIX + 586 pp. Illustrated. $7.00.

The first two editions of this invaluable volume were welcomed by the water-works fraternity. The third edition, with its complete revision and the addition of color plates and of considerable material on the study of lakes, completely overshadowed the two earlier editions. The fourth edition, just published, with the revisions by those carrying on the work of the late George Chandler Whipple in the Department of Sanitary Engineering at Harvard University, perpetuates the admirable work begun by that noted biologist and teacher. The volume is intended not only as a text-book, but as a reference book for the water analyst and the water-works operator, and covers the entire field in a most thorough manner. After showing the need for microscopic examination of water, careful attention is given to types and sources of microscopic organisms, the equipment for the collection and examination of samples of water, from the microscopic standpoint, and a discussion of odors and tastes in water-supplies as caused by algae. An entire chapter is devoted to the method of recording results of examinations and analysing these results. The science of limnology or the study of lakes, to which it was Professor Whipple's ambition to devote an entire volume, is given admirable treatment in a series of chapters that show the effect of heat, wind and light on growths of plankton in lake waters and trace the food supply and results of plankton growth. Other chapters are devoted to the storage of water and the self-purification of streams. Methods of controlling algae by prevention of growth and destruction of growth, and the purification of water containing algae, are well worth close study by water-works operators. Seventeen chapters are devoted to the classification of microscopic organisms and specific groups of organisms. At the back of the volume are 19 colored plates of inestimable value in identifying the common and some of the less frequently seen organisms. Those who have possessed copies of the earlier editions of this book will undoubtedly wish to own the revised fourth edition, and those who have recently entered the field cannot do without it.

Quality of the Surface Waters of New Jersey.—Water Supply Paper 596-E of the United States Geological Survey, by W. D. Collins and C. S. Howard, giving the results of studies by the United States Geological Survey and the New Jersey Department of Conservation and Development. A table of 121 analyses of surface waters taken at many points in the state is included. (Apply to the Geological Survey, Washington, D. C.)

Regulating the Sale of Cigarettes to Minors.—3 typewritten pages, carrying the full title, "Brief List of References to State Laws and Municipal Ordinances Regulating or Prohibiting the Sale of Cigarettes and Other Tobacco Products to Minors." Compiled by the Municipal Reference Library of Chicago, Frederick Rex, Librarian. (Apply to the Library, 1005 City Hall, Chicago, Ill.)

Traffic Regulation and General Cooperation between Police and Fire Departments.—Papers by John Kenlon, Chief of the New York City Fire Department, and Daniel O'Brien, Chief of Police, San Francisco, with discussion, as presented at the convention of the International Association of Fire Chiefs, in August, 1927, and published in pamphlet form by the National Board of Fire Underwriters. 19 pages. (Apply to the Board, 85 John Street, New York.)

Municipally Owned Passenger Automobiles.—A report of the Finance Commission to the Mayor and City Council of Boston, Mass., which criticizes as wasteful the policy of operating municipally owned passenger automobiles. 12 mimeographed pages. (Apply to Finance Commission, 11 Beacon Street, Boston, Mass.)

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Juvenile Courts in the United States: Their Law and Practice.—By Herbert H. Lou, Ph.D. The University of North Carolina Press, Chapel Hill, N. C. 1927. XVII + 277 pp. $3.00, postpaid.

With the primary purpose of analyzing the legal and social machinery with which children's problems are handled, this book constitutes an examination of the whole juvenile court movement, including its principles, development, present status, and forms of organization, together with its practical working and its significant tendencies. It points out, incidentally, a possible way to better handling of adult offenders in criminal courts. It goes into the cause and prevention of delinquency and other childhood abnormalities, and considers the sociological and psychological aspects of the juvenile court. The many kinds of laws that should exist along with that strictly relating to the court are also discussed. Appendices includes a set of juvenile court standards, and a model law relating to the court, together with bibliography, table of cases, and index.

Rapid Transit Development and the Modern City Plan.—A 6-page article by J. Rowland Bibbins, consulting engineer, Washington, D. C., reprinted from *The Annals* of the American Academy of Political and Social Science for September, 1927. (Apply to the Academy, 3622 Locust Street, Philadelphia, Pa.)

State Health Department Supervision in the Control of Tuberculosis.—A summary of the tuberculosis work of each state and territorial health department, with tables based thereon, and data relating to the reporting of tuberculosis in New York State, exclusive of New York City. The information regarding these states and territories is based on questionnaires returned by the respective health departments to Dr. Robert E. Plunkett, Director, Division of Tuberculosis, New York State Department of Health, who has prepared the study presented in this 79-page pamphlet. (Apply to National Tuberculosis Association, 370 Seventh Avenue, New York.)

The Care of Shade Trees.—A 4-page bulletin of the Park Department of Dallas, Texas, by O. C. Charlton, City Forester, describing methods of cultivation, watering, and fertilizing shade trees. November, 1927. (Apply to the Park Department, Dallas, Texas.)

The Cons and Pros of Civil Service in Police Administration.—Conflicting arguments on the subject, one on "Failure of Civil Service Commissions in Selection of Personnel," from the Report on Municipal Police Administration to the New York State Crime Commission; the other entitled "Independent Civil Service Commission only Defense Against Politics," by H. W. Marsh, Secretary, New York State Civil Service Reform Association. It appears in the *National Municipal Review* for November, 1927. 5 pages. (Apply to *National Municipal Review*, 261 Broadway, New York.)

Beach Preservation in Connection with Regional and City Plans.—A paper presented at the meeting of the American Shore and Beach Preservation Association, in May, 1927, by Thomas Adams, Director of Plans and Surveys, Regional Plan of New York and Its Environs, and included in the printed report of the meeting. 13 pages, including discussion. (Apply to R. S. Patten, National Research Council, Washington, D. C.)

Algae Control Methods and Identification.—A report on algae control methods adaptable to Texas waters, and a descriptive list of algae groups, for identification. It was prepared by Chester Cohen and Ella G. White, State Department of Health, Austin, Texas. June, 1927. 8 mimeographed pages. (Apply to the Department.)

Index to Proceedings, A. S. T. M.—A 224-page book comprising a collective index to Volumes 21-25, of the Proceedings of the American Society for Testing Materials (1921-1925). It contains a comprehensive subject index, an author's index, and a complete table of contents of the five volumes covered. $2.50, cloth; $3.50, half leather. (Apply to the Society, 1315 Spruce Street, Philadelphia, Pa.)

Chicago's Traffic Problems Solved by Burnham Plan.—An 11-page article by Anne Lee in *The Architectural Record* for October, containing ten airplane views and sketches, and a map, and describing various present and prospective improvements in Chicago and their effect on traffic. 35 cents. (Apply to F. W. Dodge Corporation, 115 West 40th Street, New York.)

Safety First.—A vest-pocket booklet of useful information for the guidance of motor vehicle users, presented by James Kearns, Clerk of the Municipal Court, Chicago, Ill. It gives information regarding registration and licenses, lights, speeding, parking, traffic signals, rules for traffic, etc. 28 pages. (Apply to Mr. Kearns.)

Technique of Social Surveys.—By Manuel L. Elmer, Head of the Department of Sociology, University of Pittsburgh. Jesse Ray Miller, 3566 University Avenue, Los Angeles, Calif. 1927. 260 pp. $2.00.

This is the third edition of a book designed as a brief guide to the making of community surveys from the social viewpoint. It has been revised as a result of greater standardization in research technique, progress in social science and related fields, and various other changes. It is divided into "Organization of Community and Survey Machinery," "Securing the Data for the Community Survey," and "Interpretation and Use of Data." A score sheet of educational, religious, recreational and economic activities is given, covering 29 pages. There is a bibliography of 27 pages.

Report of the Westchester County Park Commission, 1927.—A handsome booklet of 125 pages, illustrated by many photographs and drawings. It is the Commission's fifth annual report, and describes the continuation of the tremendous progress being made in park development. Financial statements and a list of land acquisitions are included in addition to the text. (Apply to the Commission, 72 West Pondfield Road, Bronxville, N. Y.)

A Report of the Preliminary Passaic County Park Commission.—A 17-page report to the Supreme Court of New Jersey, under date of September 10, 1927, on the advisability of laying out ample open spaces for the use of the public. This preliminary Commission was appointed last year to prepare a plan for a park system for Passaic County. The organization of a permanent County Park Commission, and a related bond issue of $2,500,000, were approved at the November election, 1927. (Apply to the Commission, 315 Fabian Building, Paterson, N. J.)

Rules and Regulations, Municipal Playgrounds, City of Chicago.—A 65-page booklet of vest-pocket size, of the Bureau of Parks, Playgrounds and Bathing Beaches of Chicago. In addition to the rules and regulations proper, and instruction regarding reports, etc., there is a list of suggested events that may be promoted in each playground at the option of the director, together with certain descriptive matter relating thereto. (Apply to the Municipal Reference Library, 1005 City Hall, Chicago, Ill.; 2 cents postage.)

Thomas' Register of American Manufacturers.—The 18th edition of this official register has just been issued. It embodies more than 250,000 changes from the 17th edition, and contains 4,500 pages. Under every known heading, manufactured products are listed in the main portion. Trade names are also listed and a complete alphabetical list of manufacturers appears in the back. $15.00. (Apply to Thomas Publishing Co., 461 Eighth Avenue, New York.)

Municipal Aeroplane Landing Fields.—A list of books and articles on this subject, compiled by R. E. Gussage, and appearing in *Municipal Reference Library Notes*, October 26, 1927. It is supplementary to the bibliography of January 7, 1925, and thus furnishes an index to the large amount of material appearing within the last three years. 3 pages. (Apply to the Municipal Reference Library, Room 512, Municipal Building, New York.)

School Health Service Annual Report for 1926-27, Detroit, Mich.—Don W. Gudakunst, M.D., Director of Health Service, Detroit Department of Health, presents this report, which is contained in the July-August issue of *City Health*. There are special sections on crippled children, children stunted in health, dental inspection, and vital statistics. 25 pages. (Apply to Department, 1300 Beaubien Street, Detroit, Mich.)

Business Frontage and Its Relation to Population in the Region of Chicago.—Four blue-printed sheets constituting a revision, as of September 15, 1927, of the similar report of July 1 noted in THE AMERICAN CITY for September, at page 335. More cities and villages are included; the conclusions and recommendation are otherwise the same. (Apply to Chicago Regional Planning Association, Burnham Building, Chicago, Ill.)

Comparative Appropriation Items of Illinois Municipalities over 5,000 Population.—Bulletin No. 22 of the Illinois Municipal League, containing an explanatory foreword by Secretary A. D. McLarty, and a table giving appropriations subdivided into 16 items for the various cities having over 5,000 population. 12 pages. (Apply to the League, Urbana, Ill.)

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Proceedings of the National Conference of Social Work, 1927.—The University of Chicago Press, Chicago, Ill. 1927. VI + 736 pp. $3.50.

This volume is made up almost entirely of papers and addresses on a great variety of aspects of social work and its setting; business matters of the Conference occupy only 22 pages. The range of topics is indicated by titles such as "The Survey in the Development of a Local Child Welfare Program," and "The Challenge to Democracy." There is a bewildering wealth of material for study and casual reading throughout the field of social welfare. Following the report of the general sessions, in which many distinguished speakers participated, the contents are grouped under twelve divisions: Children; Delinquents and Correction; Health; The Family; Industrial and Economic Problems; Neighborhood and Community Life; Mental Hygiene; Organization of Social Forces; Public Officials and Administration; the Immigrant; Professional Standards and Education; and Educational Publicity.

Traffic Survey Bureau Report, Detroit, Mich.—This is the second part of the traffic survey report of the Detroit Department of Police. It is a mimeographed volume of 108 pages and many inserts, dated September 29, 1927. A list of 31 suggestions relating to parking and automobile storage, street and alley paving, merchandise distribution, pedestrian subways, pedestrian control, street railway and bus lines and other aspects of the traffic problem is included. It is expected that the report will be printed. (Apply to A. T. Waterfall, Commissioner of Public Safety, Department of Police, Detroit, Mich.)

A. S. T. M. Tentative Standards, 1927.—A volume of 824 pages in which are set forth 175 tentative standards of the American Society for Testing Materials. These standards relate to ferrous and non-ferrous metals, cement, lime, gypsum, and clay products; preservative coatings and petroleum products; road materials, waterproofing and roofing materials; rubber products, insulating materials and textile materials; coal, coke, timber and miscellaneous materials. They are presented with a view to eliciting criticism before formal acceptance by the Society. $7, paper; $8, cloth. (Apply to the Society, 1315 Spruce Street, Philadelphia, Pa.)

Recommended Uniform Traffic Ordinance for Illinois Municipalities.—Bulletin No. 23 of the Illinois Municipal League, presenting a uniform traffic ordinance, prepared by Thomas A. Matthews, Attorney, Legal Division of the League, recommended for adoption by Illinois cities. 8 pages. (Apply to the League, Urbana, Ill.)

Illinois Motor Vehicle Law.—A vest-pocket booklet of 67 pages, containing the text of the motor vehicle law of Illinois, in force July 1, 1927, compiled by Louis L. Emmerson, Secretary of State. It includes an index. (Apply to Municipal Reference Library, 1005 City Hall, Chicago, Ill.; 2 cents postage.)

May We Present the Roadhouse?—An article by Jessie F. Binford, Director, Juvenile Protective Association, Chicago, Ill. Reprinted from the July, 1927, *Welfare Magazine*, as a 9-page pamphlet. It represents a survey of existing roadhouse conditions in Cook County, Ill. (Apply to the author, 816 South Halsted Street, Chicago, Ill.)

Smallpox Is Preventable.—A pamphlet re-issued and completely revised by the American Association of Medical Progress. It includes an account of the disease, a discussion of the theory of vaccination and its relation to epidemics and the prevention of smallpox. 20 pages. $4 per hundred. (Apply to the Association, 377 Seventh Avenue, New York.)

Annual Report, Department of Public Works, Chicago.—A 355-page volume with several tabular and half-tone inserts; it is the 51st Annual Report of the Department, and is for the year 1926. The Engineer's report occupies the greater part. There are also reports of the Bureaus of Water, Rivers and Harbors, Streets, Waste Disposal, Parks, Sewers, Maps, and Architecture, and of the consulting engineer and the head accountant. (Apply to Municipal Reference Library, 1005 City Hall, Chicago, Ill.; 15 cents postage.)

The Proper Training of Midwives; New Jersey Midwives and the Law.—Two papers, by George O. O'Hanlon, M.D., Director, Jersey City Hospital, and Charles B. Kelly, M.D., Secretary, State Board of Medical Examiners, respectively, in *Public Health News*, of the Department of Health of the state of New Jersey, for August, 1927. 5 pp. each. (Apply to the Department, Trenton, N. J.)

The Psychology of Play Activities.—By Harvey C. Lehman and Paul A. Witty, School of Education, University of Kansas. A. S. Barnes & Co., New York. 1927. XVIII + 242 pp. $2.00.

This represents an experiment in the direction of quantitative measurements of play behavior, with an investigation into the games and other play activities most commonly engaged in by young people, from five to twenty-two years of age, in various communities. The preferences among such games and activities as expressed by the participants were obtained, together with the designation of the one to which the most time was devoted. Effects of age, sex, race, season, intelligence, community, etc., were studied. Many tables and graphs are used to summarize and interpret the data gathered. The book should be of interest both to school officials and to recreation supervisors.

Wie Baut Amerika? (How Does America Build?)—By Richard J. Neutra. Julius Hoffman, Stuttgart, Germany (also Brentano's, New York and Chicago). 1927. 78 pp. 8.50 marks.

The author of this original discussion, in German, of modern architecture and building construction in the United States, is a member of the Chicago chapter of the American Institute of Architects, and also of the Los Angeles City Club. His book, of folio size with paper covers, is handsomely prepared and well illustrated. Modern American architecture, as evolved in mass-construction, is looked upon to be a significant expression of our changing American civilization, to which the author takes a favorable and optimistic attitude. City planning and zoning are treated incidentally; an effect of the latter, along with height limitation, is stated to be to encourage block rather than single-lot development. A wide variety of buildings, from a functional standpoint, is considered.

The City of the Future.—A 4-page article by Ernest Flagg in the *Scientific American* for September, 1927, relating to the design of highways, buildings and sidewalks, so as to reduce congestion. Elevated express highways are featured. A second installment appeared in October. 35 cents. (Apply to *Scientific American*, 24 West 40th Street, New York.) The September-October number of *Safety*, published by the American Museum of Safety at 141 E. 29th Street, New York, gives extensive quotations from Mr. Flagg's article, with additional illustrations.

Public Evening Schools for Adults.—Bulletin No. 21 (1927) of the Bureau of Education, United States Department of the Interior, by L. R. Alderman, Specialist in Adult Education, describing these schools in various cities, and giving suggestions for the success of evening schools. 22 pp.; illustrated. (Apply to Superintendent of Documents, Government Printing Office, Washington, D. C.)

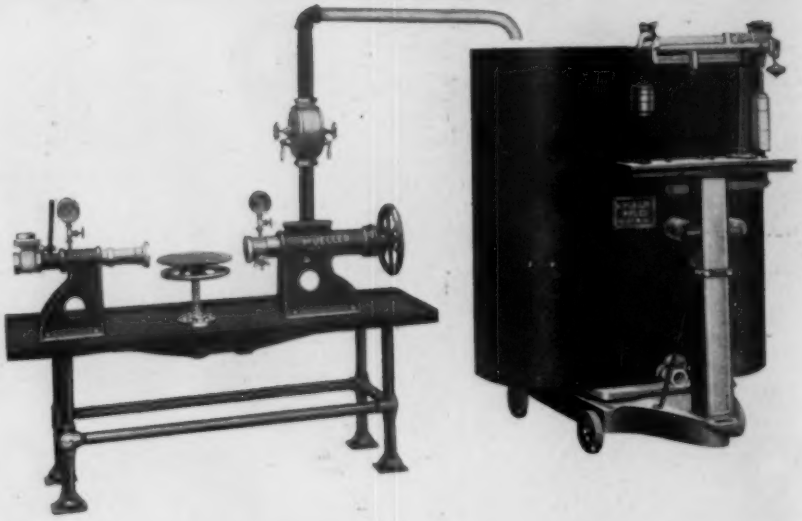
Reports on Police and Fire Departments, New Jersey.—Reports Nos. 187, 188, 189, and 190 of the Bureau of Municipal Information, New Jersey State League of Municipalities, giving respectively for New Jersey municipalities in 1927 policemen's salaries, size and character of police force, firemen's salaries, and size and character of fire departments. 3, 2, 2, and 2 pp., respectively. (Apply to Sedley H. Phinney, Executive Secretary, 34 West State Street, Trenton, N. J.)

Planning Washington and Its Environs.—An article by Charles W. Eliot 2nd, City Planner, National Capital Park and Planning Commission. Reprinted from the July, 1927 issue of *City Planning*. 18 pages. (Apply to American Civic Association, Union Trust Building, Washington, D. C.)

The Advance of the American School System.—This is the topic of the September *Research Bulletin* of the National Education Association, and constitutes a review of progress in public education in this country. 29 pages. 25 cents. (Apply to Research Division, National Education Association, 1201 16th Street N. W., Washington, D. C.)

A Recommended Ordinance Regulating Automobile Filling Stations.—Bulletin No. 24 of the Illinois Municipal League, dated November, 1927, prepared by Thomas Matthews, Attorney, Legal Division of the League. A brief discussion of the power of regulating automobile filling stations, possessed by Illinois municipalties, and a model ordinance recommended for adoption by the latter. 3 pages. (Apply to Illinois Municipal League, Urbana, Ill.)

Fireproofing Specifications for Structural Steel.—A 12-page pamphlet of the American Institute of Steel Construction, Inc., dated October 8, 1927. It has been prepared by a committee of prominent engineers. (Apply to the Institute, 285 Madison Avenue, New York.)



Are your meters *telling the truth?*

Include a Meter Tester in Next Year's Appropriation and End Costly Losses on Those Under-Registering Meters

FOR the sake of protecting your city or waterworks against losses on under-registering meters, be sure to include a MUELLER meter tester in your 1928 appropriations. A number of meters, under-registering, will lose more honestly earned revenue over a few months' period, than a MUELLER meter tester would cost. And, according to statistics, meters are much more apt to under-register than to over-register.

It will be to the interest of your city or waterworks, then, to be sure to include a meter tester in next year's appropriation. But be sure that the tester which you buy is made by MUELLER of Decatur. The name of MUELLER is already a recommendation to your engineers. And the size and appearance of the MUELLER meter tester will inspire the confidence of those who watch the actual testing of the meters.

A MUELLER meter tester is simple of operation. It is strongly made; the table is cast-iron with wrought-iron legs, and cast-iron head blocks. This tester is made to test meters from ⅝ to 2 inches, and with special equipment, will make tests on 12-inch meters.

Plan now to purchase one for next year—and for years to come.

It will give a lifetime of service, and its cost will be absorbed in the savings you make on under-registering meters.

Write for catalog giving full and detailed description of the MUELLER Meter Testing Machine.

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Mention THE AMERICAN CITY—it helps.

Annual Report, Pennsylvania Housing and Town Plan Association, 1927.—A 19-page pamphlet containing the third annual report of this Association to May 1, 1927. It briefly summarizes new housing legislation and city planning and zoning progress in Pennsylvania, and gives information on the housing situation, sanitary facilities, water system and costs, etc. A list of subscribing members is included. (Apply to Association, 133 South 12th Street, Philadelphia, Pa.)

Salaries of Village Officials in Wisconsin, 1927.—Information Report No. 59 of the Municipal Information Bureau, University of Wisconsin, dated September, 1927, and compiled by Lorna L. Lewis. The salaries of presidents, clerks, treasurers, assessors, marshals, and trustees of Wisconsin villages in 1927 are given. 16 mimeographed pages. (Apply to the Bureau, Madison, Wis.)

Supplementary Report Upon Water Supply Improvements for Mt. Clemens, Mich.—A 17-page mimeographed report to the City Commission of Mt. Clemens, by Hoad, Decker, Shoecraft and Drury, consulting engineers, Ann Arbor, Mich., regarding the enlargement and improvement of the municipal water-supply. (Apply to the engineers.)

New York City Transit, 1927.—A booklet of 95 pages, containing a report of C. E. Smith, consulting engineer, of St. Louis, Mo., submitted to Hon. Charles W. Berry, Comptroller of the City of New York, September, 1927. It represents the result of a study of the transit situation in New York City, starting in April, 1927, with reference to both temporary and permanent transit relief, and the engineering, financial and operating aspects of future transit plans. (Apply to Mr. Smith, 2073 Railway Exchange Building, St. Louis, Mo.)

Reports Received

DULUTH, MINN.—Annual Reports, Chamber of Commerce, 1926-1927.

HARTFORD, CONN.—Annual Report, Board of Park Commissioners, to March 31, 1927.

ST. PAUL, MINN.—Annual Report, Commissioner of Public Works, 1926.

SAN FRANCISCO, CALIF.—Annual Report, Bureau of Engineering, Department of Public Works, to June 30, 1926.

SEATTLE, WASH.—Annual Report, Department of Lighting, 1926.

Conventions—When and Where

DECEMBER 1-2.—WASHINGTON, D. C.
Highway Research Board, National Research Council. Annual meeting. Director, Charles M. Upham, Washington, D. C.

DECEMBER 2-3.—PRINCETON, N. J.
New Jersey Sanitary Association. Annual meeting. Secretary, Edward Guion, M.D., Box 418, Atlantic City, N. J.

DECEMBER 5.—PUEBLO, COLO.
State Association of Commercial Organizations of Colorado. Annual convention. Secretary-Manager, Elmore Petersen, Boulder, Colo.

DECEMBER 5-9.—WASHINGTON, D. C.
Aeronautics Branch, Department of Commerce. Conference of civil aviation representatives. Address: Assistant Secretary of Commerce for Aeronautics, William P. MacCracken, Jr.

DECEMBER 7-8.—WASHINGTON, D. C.
National Rivers and Harbors Congress. Annual convention. Secretary, S. A. Thompson, 824 Colorado Building, Washington, D. C.

DECEMBER 8.—NEW YORK.
American Institute of Weights and Measures. Annual meeting. Secretary, W. E. Bullock, 115 Broadway, New York.

DECEMBER 9-10.—WILSON, N. C.
North Carolina Commercial Secretaries Association. Annual convention. Secretary, Joe Stubbs, Hendersonville, N. C.

DECEMBER 15-16.—WINTER PARK, FLA.
Florida League of Municipalities. Annual meeting. Secretary-Treasurer, E. P. Owen, Jr., City Hall, Jacksonville, Fla.

DECEMBER 19-21.—LAWRENCE, KANS.
American Municipal Association. Annual meeting. Executive Secretary, John G. Stutz, Lawrence, Kans.

DECEMBER 27-30.—WASHINGTON, D. C.
American Sociological Society. Annual meeting. Secretary, E. W. Burgess, Faculty Exchange, University of Chicago, Chicago, Ill.

DECEMBER 28-30.—WASHINGTON, D. C.
American Political Science Association. Annual meeting. Secretary, Prof. J. R. Hayden, University of Michigan, Ann Arbor, Mich.

JANUARY 9-10.—DETROIT, MICH.
International Association of Street Sanitation Officials. Annual convention. Secretary, A. M. Anderson, 10 South LaSalle Street, Chicago, Ill.

JANUARY 9-11.—WASHINGTON, D. C.
American Engineering Council. Annual meeting. Executive Secretary, L. W. Wallace, 26 Jackson Place, Washington, D. C.

JANUARY 9-13.—CLEVELAND, OHIO.
American Road Builders' Association. Annual convention and Road Show. Secretary, Ethel A. Birchland, Earle Building, Washington, D. C.

JANUARY 12-14.—SAN JOSE, CALIF.
California Association of Commercial Secretaries. Annual convention. Secretary, Theodore Grady, Jr., Monterey, Calif.

JANUARY 18-20.—NEW YORK.
American Society of Civil Engineers. Annual meeting. Secretary, George T. Seabury, 33 West 39th Street, New York.

JANUARY 19.—LYNCHBURG, VA.
Virginia State Chamber of Commerce. Annual meeting. Managing Director, R. LeRoy Hodges, 708 Grace-American Building, Richmond, Va.

JANUARY 19-21.—LOUISVILLE, KY.
American Water Works Association, Kentucky-Tennessee Section. First meeting. Secretary, F. C. Dugan, 532 West Main Street, Louisville, Ky.

JANUARY 23.—WEST BADEN, IND.
Associated General Contractors of America. Annual convention. Secretary, Colonel D. H. Sawyer, 1150 Munsey Building, Washington, D. C.

FEBRUARY 3.—NEWARK, N. J.
New Jersey State League of Municipalities. Annual convention. Secretary, Sedley H. Phinney, 34 West State Street, Trenton, N. J.

FEBRUARY 8-10.—WATERLOO, IOWA.
Iowa Engineering Society. Annual meeting. Secretary, John S. Dodds, Ames, Iowa.

FEBRUARY 13-17.—NEW YORK.
American Institute of Electrical Engineers. Winter convention. Secretary, F. L. Hutchinson, 33 West 39th Street, New York.

FEBRUARY 21-24.—WICHITA, KANS.
Southwest Road Show and School. Secretary-Treasurer, F. G. Wieland, Wichita, Kans.

FEBRUARY 23-24.—DENVER, COLO., and
FEBRUARY 25.—PUEBLO, COLO.
American Water Works Association, Rocky Mountain Section. Annual meeting. Secretary, Dana E. Kepner, State Board of Health, 420 State Office Building, Denver, Colo.

FEBRUARY 23-25.—TORONTO, ONT.
Ontario Good Roads Association. Annual meeting. Secretary, W. S. Squire, Toronto, Ont.

FEBRUARY 25—MARCH 1.—BOSTON, MASS.
National Education Association, Department of Superintendence. Annual meeting. Secretary, S. D. Shankland, 1201 16th Street, N. W., Washington, D. C.

FEBRUARY 28-MARCH 1.—PHILADELPHIA, PA.
American Concrete Institute. Annual convention. Secretary, Harvey Whipple, 2970 Grand Boulevard, Detroit, Mich.

MARCH 8-10.—LEWISTON, MONT.
American Water Works Association, Montana Section. Annual meeting. Secretary, Herbert B. Foote, Division of Water and Sewage, State Board of Health, Helena, Mont.

MAY —.—DALLAS, TEXAS.
National Conference on City Planning. Annual conference. Secretary, Flavel Shurtleff, 130 East 22nd Street, N. Y. C.

MAY 7-10.—ATLANTIC CITY, N. J.
National Fire Protection Association. Annual meeting. Secretary, Franklin H. Wentworth, 40 Central Street, Boston, Mass.

JUNE 8-9.—BALTIMORE, MD.
American Association for Promoting Hygiene and Public Baths. Annual meeting. Secretary, Hildergarde M. Rosen, 139 West 96th Street, New York.

JUNE 10-14.—SAN FRANCISCO, CALIF.
American Water Works Association. Annual convention. Secretary, Beekman C. Little, 170 Broadway, New York.

New York City
Turns From the Old Paper Ballot
To Voting Machines

TWO-thirds of the voters in New York City cast their ballot at the November 8 election on voting machines. With the Presidential election in 1928 every precinct in New York will be equipped with voting machines—approximately 3,000 in all.

THE old paper ballot is being discarded by progressive communities everywhere in favor of this modern mechanical method of voting. Absolute accuracy in the count, ease and speed in voting, elimination of fraud and spoiled ballots, and their economy have caused voting machines to be used in over 1800 cities, towns and villages.

Your city can install voting machines and let them pay for themselves out of savings they make possible.

AUTOMATIC REGISTERING MACHINE COMPANY, INC.
Jamestown, New York

SEND TODAY FOR ILLUSTRATED DESCRIPTIVE BOOKLET

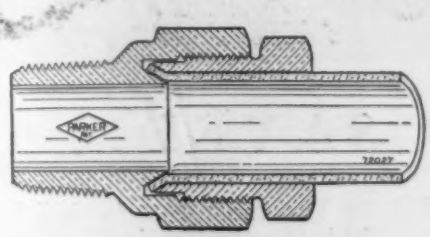
News and Illustrations

Items of Interest to City, Town and County Officials, and Others Concerned with the Economical Construction and Efficient Operation of Public Improvement Undertakings

Tube Couplings for Copper Tube Water Services

Tube couplings for joining water service pipes that are unconditionally guaranteed to withstand a pull of 5,000 pounds, without failure, are being manufactured by The Parker Appliance Co., 10320 Berea Road, Cleveland, Ohio. These couplings make threading unnecessary and provide a quick, economical, permanent, and vibration-proof joint. Subjected to unusual strains from settling earth, they are unequaled for resistance and long life in underground use.

The tube coupling joints are made easily; the nut is slipped over the end of the tube, allowing the tube to protrude slightly beyond the end of the nut; the flaring tool is inserted with a sharp strike of the hammer, and then the joint is made. There are no threads to cut, no thread compound, no rubber washers, no soft, pliable metal in making this secure, leak-proof joint. The couplings adjust themselves to the tube and flare variation so that tight metal-to-metal joints are automatically



CROSS-SECTION OF A PARKER TUBE COUPLING

made without thread compound or other makeshift. They can be made by unexperienced labor and under unfavorable conditions.

For underground service this company has developed a high copper alloy of very low zinc content and high nickel content which offers resistance to electrolysis or other destructive action. According to the manufacturers, copper tube is equally as resistant to corrosion as lead pipe, and of far greater mechanical strength. It can readily be fabricated without complicated equipment, tooling, or facilities. The greater tensile strength of copper tube assures a more secure installation, and the service pipe may be safely installed where a sewer or other excavation crosses the line of the service pipe. Copper tube will withstand the strains of settling ground with greater security than lead, iron or steel pipe.

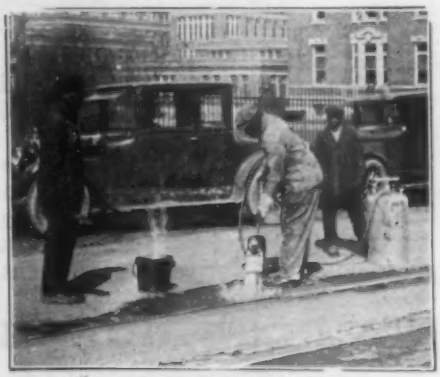
The service pipe fittings of this company are manufactured for tube of slightly greater internal diameters than standard iron pipe and in accordance with the customary specification of service pipe fittings for water and gas services and for plumbing work. Tube coupling outlets are machined to standards which permit the use of heavier wall tube than specified as standard, or, where desired, lighter wall tube may be used. Tube couplings and fittings are made in all shapes and sizes, to meet every requirement. Fittings with special threads for meter connections, branch fittings or other special shapes can also be supplied.

A New Portable Oil Burner

A new torch-style portable oil-burner unit has recently been placed on the market by Littleford Bros., 500 East Pearl Street, Cincinnati, Ohio. It provides at a very low cost an intense heat which is easily and quickly controlled and adjusted, and which can easily be moved from place to place.

These oil burners are used to dry holes in streets before patching them. They are also employed successfully for concrete heating in connection with winter construction work, heating mortar in cold weather, thawing frozen piles of sand, gravel, coal, coke, stone, etc., heating asphalt in melting kettles, drying concrete tunnels and subways for waterproofing, thawing frozen ground before excavating, melting ice and snow off street manhole covers, thawing frozen hoppers of coal cars and frozen railroad switches, and many other operations.

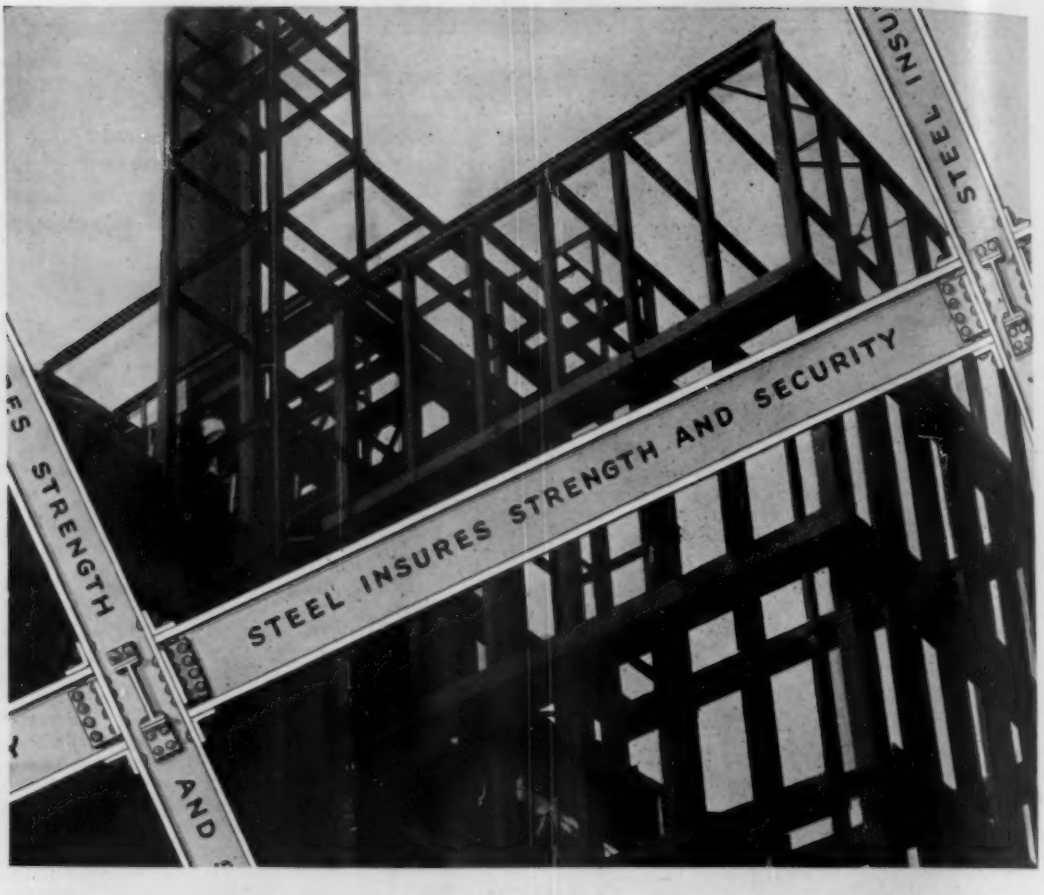
Contractors and state highway departments are finding these oil-burner units necessary equipment for general and emergency use.



PORTABLE OIL BURNER FOR DRYING OUT STREET BEFORE PATCHING

Birmingham Office of Hunt Company

The Robert W. Hunt Co., engineers, 2200 Insurance Exchange, Chicago, Ill., have announced the new location of their Birmingham office in the Bankers Bond Building, Birmingham, Ala.



$30,000,000 SAVED!

THE American Institute of Steel Construction has already contributed to modernizing the building codes of more than a hundred cities in this country and Canada. This has meant an estimated saving to builders, owners and taxpayers of more than $30,000,000 annually. The Institute enlisted the aid of America's ablest engineering talent in developing its Standard Specification for the design, fabrication and erection of structural steel for buildings . . . This Specification is endorsed by such bodies as the A. S. C. E., the New York Building Congress, and the Pacific Coast Building Officials Conference. It supplements a Code of Standard Practice designed to obviate misunderstandings between the buyer and seller of structural steel. Send for copies of the Standard Specification and Code of Practice. There is no obligation. We will also send the valuable fact-book, "STEEL NEVER FAILS."

AMERICAN INSTITUTE OF STEEL CONSTRUCTION, Inc.

The cooperative non-profit service organization of the structural steel industry of the United States and Canada. Correspondence is invited. 285 Madison Ave., New York City.

Steel Insures Strength and Security

Do you mention THE AMERICAN CITY when writing? Please do.

ZINC-SPRAYING AN 8-INCH PIPE LINE BY THE METALAYER PROCESS TO PROTECT IT FROM CORROSION

Protecting Pipes and Structures with a Metal Spray

Metal spraying to prevent corrosion is facilitated and made available to nearly every branch of industrial work by the use of the MetaLayeR by the Witt-Humphrey Steel Co., Greensburg, Pa. With this tool, molten metal coatings of any commercial metal can be applied on any base such as cast iron, steel, wood, stone, leather, glass, concrete, paper and fabrics of all kinds. This metal spraying is of special value to city officials and engineers for preventing corrosion of city service pipes and mains, bridge work, construction equipment, tanks, canal lock-gates, and every other place where corrosion will cause deterioration in time.

The MetaLayeR or "Putting-on Tool" consists of an oxy-acetylene burner combined with a small turbine driven by compressed air at 50 pounds pressure. This turbine feeds metal wire automatically and continuously from a reel into the muzzle of the burner. Here the wire enters into the reducing flame zone developed from the gases. It is there melted, atomized and blown in a fine molten spray onto the surface to be coated, at a velocity of about 3,000 feet per second. The parts to be sprayed are first sand-blasted or grit-blasted te obtain a clean, open grained surface.

The sprayed coatings adhere to their base tenaciously, and the temperature of the surface being coated is raised but slightly. The metal-sprayed surface can be turned, ground, milled, filed, polished, hammered or bent. The muzzle of the sprayer is aimed at the surface to be coated, being held three or four inches from it. A single-pass spraying deposits a coating about 0.002 inches in thickness, and four or five passes will generally suffice to produce a substantial and impervious coating, just as effective as a greater thickness. The tool is easily operated and its total weight is only 3½ pounds.

No pigments, vehicles, solvents or fluxes are used in this process, but pure metal wire is melted, atomized, impacted, instantly cooled and transformed into a sheet metal covering upon the surface being sprayed. The spraying can be done either in the shop or in the field, and before, during, or after fabrication.

The interior of pipes, cylinders or vessels having small orifices can be metal-lined with this process by the use of a special patented revolving spraying tool which makes it possible to spray the inside of pipes as small as 2 inches in diameter and up to 20 feet in length.

Zinc, lead, tin, aluminum, copper, brass, bronze, iron and steel, nickel, stainless steel and many other metals can be applied successfully and easily by this tool. The spraying of small parts or articles weighing from a fraction of an ounce up to 10 pounds is done in a specially constructed mass coating machine, containing a rumbling barrel into which metal is sprayed on the surfaces of the entire charge at one operation. Threaded parts are metal-coated or lined uniformly and they do not require re-threading.

INSTALL THE
SIMPLEX TRAFFIC TIMER
—and forget your traffic problems!

ED8 Simplex Traffic Timer

This Machine is rugged in construction and as the name implies is simple in design.

Induction Disc Drive power unit—no parts running faster than 350 R. P. M.

Cam-Operated Contact Unit is of a type which has proved its worth by years of service.

Ball Bearings—fast-running shafts equipped with ball bearings.

Adjustments—wide range and easily made.

Carefree—will run for months on factory lubrication—minimum attention.

Hand Control — furnished with or without hand control.

Non-Corrosive Cabinet—control mechanism enclosed in weatherproof aluminum cabinet.

TEST THE SIMPLEX AT OUR EXPENSE. When you expect to purchase new equipment or if you have trouble with your present controller, let us send you a Simplex Traffic Timer on 30 days' trial!

Our Engineering Department is at your service.

H-S

A few Cities successfully using the Simplex:

ARKANSAS
Fort Smith — Little Rock

CONNECTICUT
New Britain — Thompsonville

FLORIDA
Coral Gables — Miami

ILLINOIS
Chicago — Moline
Freeport — Oak Park
Rock Island

INDIANA
East Chicago — Indianapolis

IOWA
Davenport — Muscatine

KENTUCKY
Earlington

LOUISIANA
New Orleans — Shreveport

MASSACHUSETTS
East Hampton — North Hampton
West Springfield

MICHIGAN
Augusta — Grass Lake

MINNESOTA
Duluth

MISSOURI
Chillicothe — Kirkville

NEW JERSEY
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NEW YORK
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Rochester

NORTH DAKOTA
Fargo — Jamestown

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Shaker Heights

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Bethlehem — Ellwood City
Erie — McKees Rocks
Williamsport

TENNESSEE
Johnson City

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Fort Worth — San Antonio

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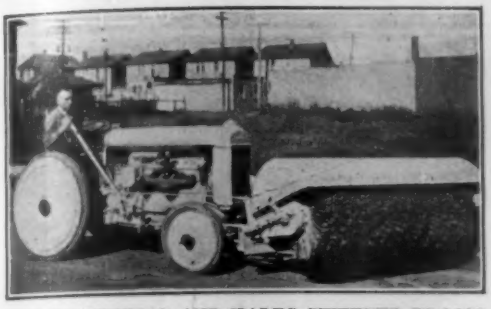
HARRINGTON-SEABERG CORPORATION

Municipal Signal Manufacturers

MOLINE, ILL.

Traffic, Police Signal and Fire Alarm Equipment



THE WHITEHEAD AND KALES SWEEPER BROOM MOUNTED ON A FORDSON TRACTOR

A Street Sweeper and Snow Broom

At present there are over 900 W & K street sweepers and snow brooms mounted on Fordson tractors in operation in cities and towns in the United States. These units were first manufactured by the Whitehead and Kales Co., Detroit, Mich., four years ago. Aside from the low first cost and maintenance, this sweeper is a 12-month unit.

The W & K brush has a sweeping surface of approximately 5½ feet. It will sweep dirt, refuse, leaves and all other light-weight materials that accumulate in city streets. It will handle snow up to 10 or 12 inches deep, leaving no hard-packed layer to turn into ice. It has six brush speeds, making it possible to sweep clean under almost all conditions.

The installation of the sweeper is made without any alterations to the Fordson in about two hours. When not required or it is desired to use the tractor for other work, the sweeper can be quickly removed or the brush can be elevated from the ground and locked in that position.

Larger cities wishing a unit of this kind simply for sidewalk cleaning, particularly during the winter months, have found that the W & K sidewalk brush takes care of this work. This sweeper is a duplicate of the standard model with the exception that the brush is narrower, having a sweeping surface of 4½ feet.

Connery & Co. Expands Plant

A two-story plant extension and office adding 35,000 square feet of new space to the existing plant has recently been completed by Connery & Co., Inc., 4000 North Second Street, Philadelphia, Pa. This plant will be devoted exclusively to the manufacture of tar- and asphalt-heating kettles, as well as breechings, uptakes, and air and preheater ducts. With these enlarged facilities, the company will be in a position to better serve its customers in the future.

New York City Uses Vacuum Street Cleaners

New York City has recently put into operation a fleet of Butler vacuum street cleaners made by the Butler Manufacturing Co., Cleveland, Ohio. The city of New York purchased three of these machines three years ago and has recently put a large fleet in operation. The machines work during the day, some of them cleaning the downtown sections of the city. Commissioner A. A. Taylor, Department of Street Cleaning, has found the dustless feature of the Butler vacuum street sweeper unique and efficient.

These devices do not use water to lay the dust, but are dustless in operation. Each sweeper cleans approximately 80,000 to 100,000 square yards each day, according to the manufacturer. The principle of operation is very similar to that of the well-known electric home vacuum sweeper. They have a large, revolving, specially constructed broom that picks up all the heavy débris onto an inclined belt conveyor. The dust is sucked up by a powerful fan and is filtered through a series of vacuum tubes.

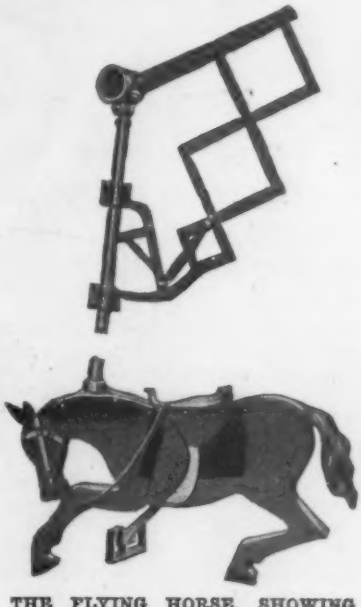
In addition to New York City, other large and small cities throughout the country have adopted this device. The manufacturers claim a much lower operating cost than through other means of street cleaning.

A New "Self-Propelling" Flying Horse

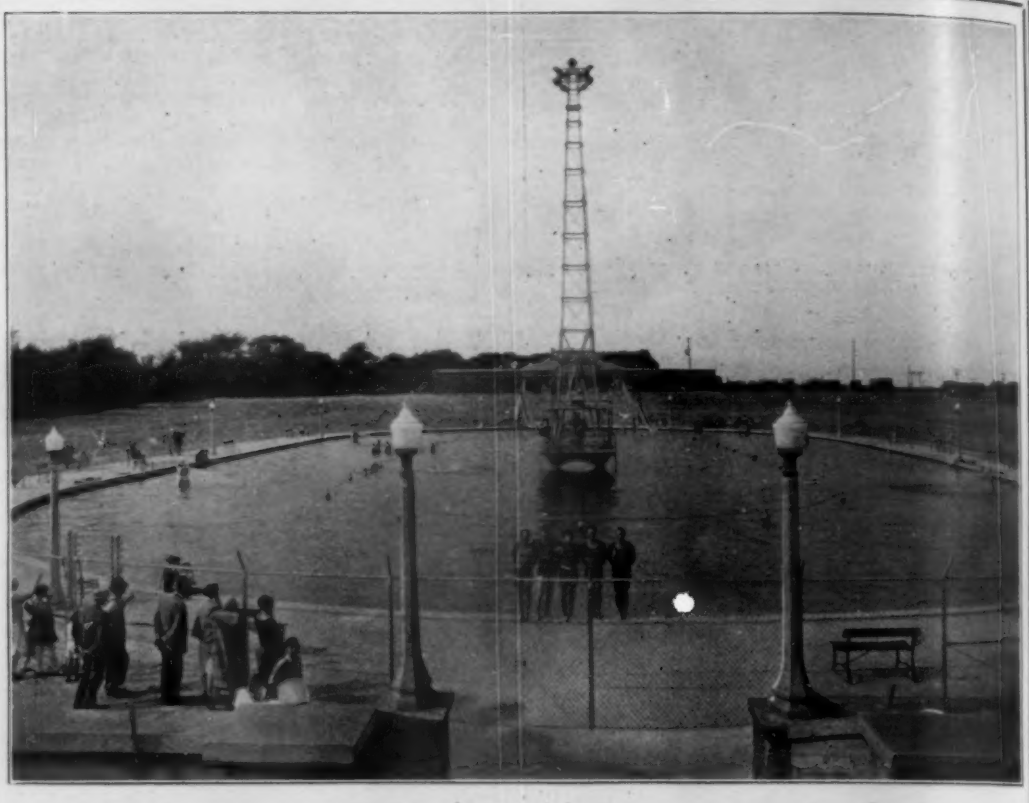
A new "self-propelling" flying horse for municipal playgrounds is being manufactured by the Giant Manufacturing Co., Council Bluffs, Iowa. This has all working parts concealed inside the horse, thus making the unit safe for children. It is regularly furnished complete with the frame, or it can be supplied to be attached to any frame of any height which may already be installed in the playground.

This flying horse makes a strong appeal to people of all ages, from small children to grown-ups. Two people can easily be supported on the horse, enabling a small child to ride with an older person. One horse and frame only can be supplied, or any large number on the same or different frame, depending on the size of the playground and its demands.

The children can ride at any rate of speed desired. The rider easily propels the horse by foot pressure on the stirrups. The stirrups move up and down as the horse swings back and forth. The mechanical leverage inside the horse operates the mechanism at the top by means of a rod which passes through the supporting pipe. All working parts are all steel with "Neveroil" graphite bronze bearings.



THE FLYING HORSE, SHOWING ACTUATING MECHANISM



SWIMMING POOL LIGHTING

The use of Chicago Concrete lighting standards is an economic as well as an ornamental proposition in swimming pool lighting.

First—No rusting of standard to stain and streak the concrete

Second—Low first cost

Third—No preparation for non-use in winter is necessary

The standard pictured above is the Chicago ten-foot Octagonal with Form No. 8 General Electric Novalux Unit.

Write for further details

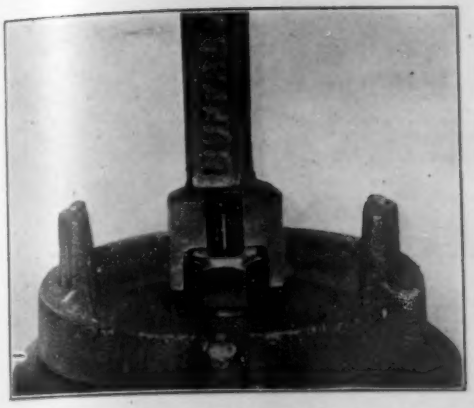
CHICAGO CONCRETE POST COMPANY

Paul K. Fleming, President

Lawrence, Lamon & Leland Avenues

CHICAGO, ILLINOIS, U. S. A.

Do you mention THE AMERICAN CITY when writing? Please do.

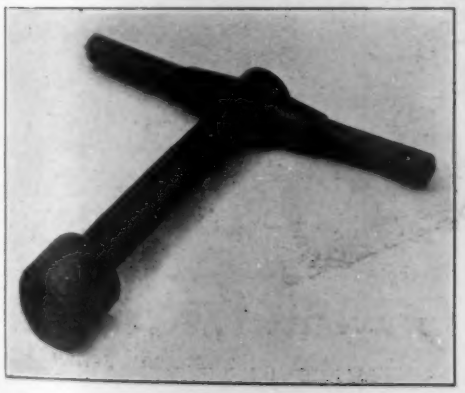


STUFFING-BOX WRENCH, CUT-AWAY TO SHOW HOW IT DOES A TRICKY JOB

Meter Company Distributing Free Stuffing-Box Wrenches

For a long time the Buffalo Meter Co., 2902 Main Street, Buffalo, N. Y., has realized that there was one kind of repair that is rather hard to make on any water meter. While the perfect interchangeability of parts and the simplified gear train construction have made all other repairs on Niagara and American meters easy, it is a tricky job to replace the stuffing-box without special tools. Repair men too often have to work with fingers, pliers or an ordinary wrench. The result has been that a lot of meters which are supposed to contain two corks or washers in the stuffing-box are sent out with only one after repairing.

To stop this trouble, the Buffalo Meter Co. is now offering a special stuffing-box wrench free to every water-works repair department. It is a thoroughly good wrench, made specially for the Buffalo Meter Co. and rustproofed by non-tarnishing silvery white cadmium plating. It fits all sizes of Niagara and American meters, and to make it useful to every meter repair man, it is designed so that it fits all other makes of meters using a 5/8-inch hexagonal stuffing-box nut. By its use a meter repair man can take two or even three washers or corks and screw them down easily with no danger of stripping the threads. The wrench covers the top of the nut entirely and direct downward pressure can be applied when the nut is turned.

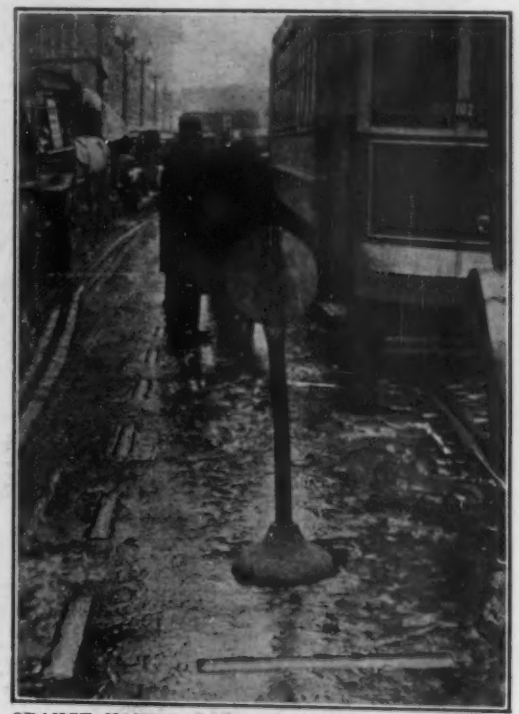


THE NEW FREE BUFFALO STUFFING-BOX WRENCH FOR METER REPAIR MEN

To secure one of these wrenches, it is only necessary to write on your water-works department or company letterhead, specifying to whom the wrench should be sent, to make sure it will reach the proper person. There are no conditions or strings to this offer and it is not necessary that the department be a user of American or Niagara meters to take advantage of it.

Rubber Markers for Roads

A new type of road marker made of orange rubber is manufactured by the National Road Marker, 210 East Erie Street, Chicago, Ill. This marker is made of a specially compounded commercial rubber with exceptional wearing qualities. The permanent orange color used in the rubber is the most visible of colors under all light and weather conditions. The orange rubber is vulcanized or cured to a resilient black rubber base, so as to form a homogeneous mass, and this combination is vulcanized to a steel base of structural shape with a minimum adhesion to the steel of 700 pounds per square inch.



ORANGE NATIONAL ROAD MARKER STRIPS FOR SAFETY ZONES

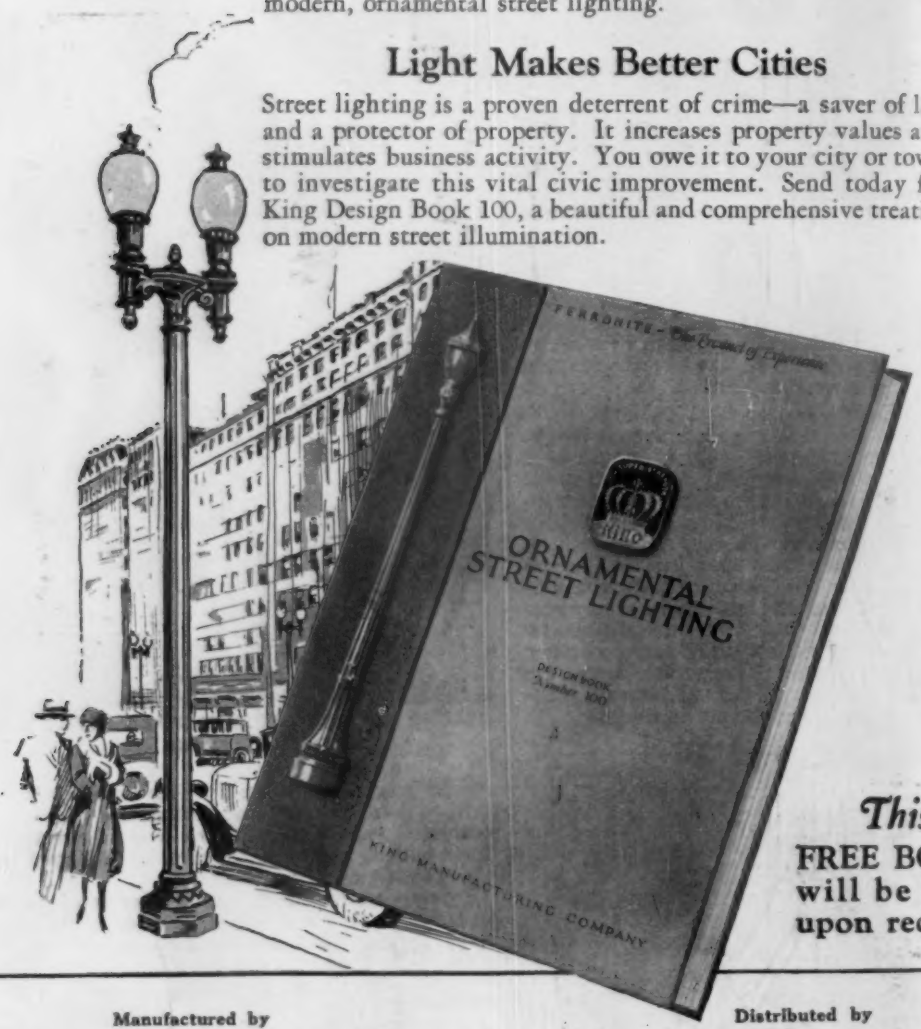
Properly anchoring a road marker is of great importance. Ample provision is made in the National Rubber Road Marker through the use of anchor bolts for plates and horizontal anchor rods for the markers with T-shaped steel base. Various surface widths, lengths, base shapes and anchor rods, eyes and bolts make it possible for these markers to meet any traffic or street conditions. Safety zones, pedestrian paths and center lines may be marked with the orange rubber strips. The unit word signs such as "Stop," "Fire," "Zone," etc., are for marking alleys, streets, fire-hydrants, sidewalks, hospital and school zones. Individual alphabet letters and numerals are made in sizes

Are you interested in the advantages of MODERN Street Lighting ?

No longer can the progressive city neglect to make safe and beautiful its busy streets, boulevards, drives and parks with modern, ornamental street lighting.

Light Makes Better Cities

Street lighting is a proven deterrent of crime—a saver of life and a protector of property. It increases property values and stimulates business activity. You owe it to your city or town to investigate this vital civic improvement. Send today for King Design Book 100, a beautiful and comprehensive treatise on modern street illumination.



This **FREE BOOK will be sent upon request**

Manufactured by

KING COMPANY

53 W. JACKSON BOULEVARD—CHICAGO

Distributed by

GraybaR Electric Co.

OFFICES IN 64 PRINCIPAL CITIES

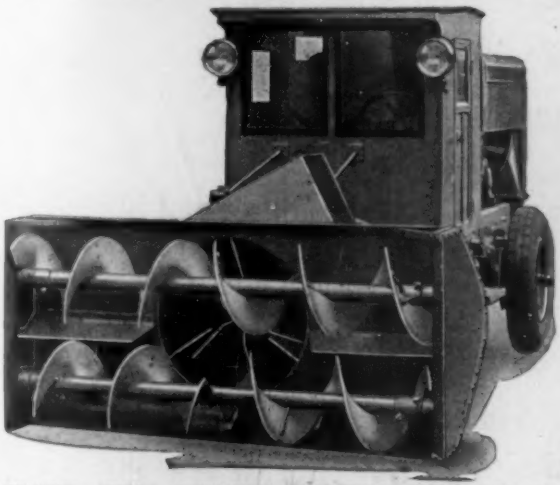
Mention THE AMERICAN CITY—it helps.

from 6 x 4 inches up to 42 x 16 inches. These letters are inlaid in orange on a rectangular black background, permitting the construction of any word or sentence in the pavement in any practical size lettering.

A New Snow Remover Mounted on Four Wheels

A piece of snow-removal equipment mounted on four wheels and having cutting augers for the handling of wet, dry, hard, soft or icy snow at any depth, has been developed by the Klauer Manufacturing Co., Dubuque, Iowa.

The machine consists essentially of an operating hood which can be dowered down to the roadway. This hood contains the cutting augers as shown in the illustration, which cut and move the snow toward the central orifice where the blower blades are located. In operation the snow is moved quickly by these blades to the orifice and then blown out of the exhaust nozzle. This nozzle may be rotated to direct the snow to the right or left at any desired elevation. The machine is made as a complete unit and not as an attachment. One engine only is required to operate the augers and the blower and to propel the machine. The propulsion requires little power, as the augers cut their own way into the snow. The blower requires the most power and is provided with a six-cylinder Climax engine developing 125 horsepower at 1,000 r. p. m.

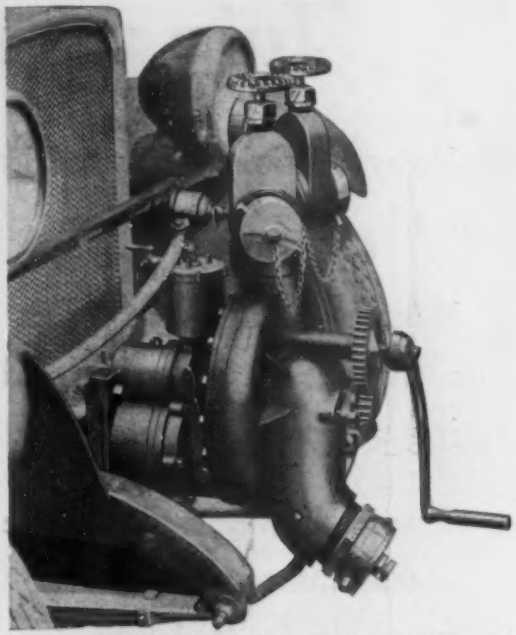


KLAUER SNOW REMOVER, SHOWING METHOD OF MOUNTING

The total weight of the machine is 1,500 pounds. It is 8 feet wide and 23 feet long. The machine makes an 8-foot cut, and additional cuts may be made to take in any width up to 8 feet in either direction. The machine has ten speeds, eight forward, ranging from ½-mile per hour up to 25 miles per hour when not removing snow. This high-travel rate permits storage in heated garages at night, as the machine can be taken to and from the place of operation. The speed range also has the material advantage of quick travel between locations of deeper drifts.

A New Portable Fire-Pump

A pump that drives direct from an automobile or truck engine, primes itself automatically and delivers two streams of water at pressures up to 200 pounds, is being manufactured by the American Steam Pump Co., Battle Creek, Mich. Its large capacity, strength, light weight, and full guarantee as to materials, construction and performance, are features. It will pump water for hours at a stretch without overheating the engine. Centrifugal in type, it will take water from any available source—hydrant, lake, steam, cistern or muddy slough—and will not falter, regardless of sand, dirt or cinders.



BARTON PORTABLE PUMP, FIRMLY ATTACHED TO FRONT OF MOTOR VEHICLE

This Type C-1 Barton portable pump is used principally for two classes of fire fighting: its affords protection for the small community, village, suburban district, amusement park, resort or isolated institution not having a water-supply system; and being a centrifugal type pump it can be used in larger towns and cities as a booster, taking water at ordinary hydrant pressure and stepping these pressures up to 200 pounds if necessary.

The pump is easily attached to the automobile frame and is driven through a patented power take-off connection, which is reliable and trouble-free. All the weight of the pump is carried by the automobile frame without danger of strain or breakage, and the road clearance of the pump attached is greater than that of the front axle. It can be driven by practically any make or model of motor vehicle developing 15 to 40 horsepower.

A hand lever operating a combination friction and dog clutch starts or stops the pump when the engine is running. The pump-shaft is set above the center line of the engine and is operated by gears intermeshing with another set of gears on the main drive-shaft. This allows the pump to run at approximately twice the speed of the automobile engine, permitting delivery of maximum

Join up for '28—

Highway officials who used Barrett materials and service in 1927 will tell you that:

Barrett field men render efficient and unobtrusive assistance in planning and carrying out road building programs.

Tarvia deliveries are made by Barrett—where, when and as wanted.

Tarvia is applied from Barrett equipment by specially trained Barrett men—the whole operation supervised by expert Barrett field men.

In brief—The Barrett Company sells more than road building materials—it sells *results.*

We'd like to work with you in '28. Let's talk it over. A postcard will bring the Tarvia field man.

Tarvia
For Road Construction Repair and Maintenance

The Barrett Company

New York	Chicago	Philadelphia	Boston
St. Louis	Cleveland	Cincinnati	Kansas City
Detroit	Salt Lake City	Birmingham	Lebanon
Minneapolis	Milwaukee	Bethlehem	Columbus
Youngstown	Syracuse	Toledo	Rochester
Baltimore	Providence		Buffalo

In Canada:
THE BARRETT COMPANY, Limited
Montreal Toronto Winnipeg Vancouver

STREAMS FROM THE BARTON PORTABLE FIRE-PUMP GO HIGH

water at maximum pressure without speeding the engine beyond its safety limit.

This pump has been designed for the most severe kind of service. The entire gear mechanism is enclosed and runs in a bath of oil. Both shafts are mounted on ball bearings. The suction opening is located on the center line of the pump and at the bottom for convenience, being low enough so that it does not interfere with cranking. The pump inlet may be easily tapped for connection to the booster tank.

A cooling strainer is provided, which prevents foreign matter from passing from the pump to the motor as the water is being forced through the motor for cooling purposes. This strainer can be removed for cleaning while the pump is running. The pump has a special bronze impeller, which handles water carrying any kind of substance, in size up to small pebbles. There are no wearing surfaces and no loss of initial high efficiency. When starting, the pump primes itself automatically and keeps primed thereafter as long as operating, under all conditions and even in zero weather.

Hazard Manufacturing Co. Forms Two New Companies

The Hazard Manufacturing Co., Wilkes-Barre, Pa., announces a division of its two distinct lines of business. The manufacture and sale of insulated wires and cables will be continued by the Hazard Manufacturing Co., and that of wire rope will be taken over by the Hazard Wire Rope Co. The present management of the old company is retained by both companies, and each company will finance its own commitments, take care of contracts and render the same excellent service as in the past.

Yeomans Representatives at Amarillo

Yeomans Brothers Co., 1417 Dayton Street, Chicago, Ill., manufacturers of sewage ejectors and pumping machinery, have announced the appointment of the Dempster Mill Manufacturing Co., at Amarillo, Texas, as its representatives in northwestern Texas.

New York Increases Traffic Signals

The red and green "stop and go" system of regulating traffic in New York City is to be nearly doubled by the installation of 300 more signals made by the General Electric Co., Schenectady, N. Y., and to be placed along Broadway and other principal avenues of the boroughs of Manhattan, Bronx, Brooklyn, and Queens. The contract is for signals of the standard New York design and for the 300 control boxes.

Trackson Distributor

The Trackson Co., 518 Clinton Street, Milwaukee, Wis., has announced the appointment of the Allen Equipment Co., 331 South Rio Grande Avenue, Salt Lake City, Utah, as distributor in the Salt Lake territory for Trackson Full-Crawlers. Both the Standard Model F and the heavy-duty Model D Trackson Full-Crawlers will be handled by this new distributor, with a complete stock of repair and replacement parts.

Truck Equipment Corporation Formed

A new company to be known as the Truck Equipment Corporation, with factory and offices located at Joliet, Ill., has been formed. D. O. Paulson is President of the new organization; C. S. Farrell, Vice-President; W. I. Jones, Secretary and Treasurer; and C. F. Greenburg, Factory Superintendent. Mr. Paulson, as well as Mr. Greenburg, was with the Municipal Supply Co. from the time of its organization until November 1, 1927. Mr. Farrell is President and Mr. Jones Secretary and Treasurer of the Farrell Manufacturing Co., at Joliet, Ill. This company is formed for the manufacture and sale of street flushers, street sprinklers, road oilers and all kinds of special equipment for motor trucks and tractors. It will have an up-to-date factory operating in connection with the Farrell Manufacturing Co., and will place on the market a product that will be high grade in every respect.

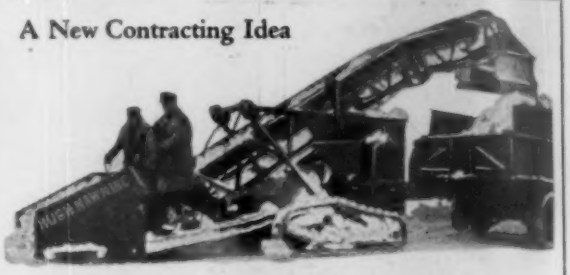
Fulton Interest in Foos Company

The Fulton Iron Works Co., St. Louis, Mo., has acquired a substantial stock interest in the Foos Engine Co., Springfield, Ohio. H. J. Steinbreder, President of the Fulton Iron Works Co., is now Chairman of the Board of the Foos Engine Co. The arrangement permits the handling by the Fulton Sales Organization, both domestic and foreign, of a complete line of diesel engines, ranging in size from 10 to 2,000 horsepower for stationary, marine, dredge, power-boat, and portable uses, such as air-compressors, shovels, draglines, etc., and locomotives and rail cars.

The small engines will be manufactured at the Foos plant, Springfield, Ohio, and the large engines at the Fulton plant, St. Louis, Mo. Each company will retain its identity.

Tearing into snow storm costs at a rate that keeps your street and alley appropriation prosperous

A New Contracting Idea



Hugh Nawn, Inc., loads snow for the City of Boston. A Barber-Greene Snow Loader speeds up work, and keeps down costs

A TIRELESS Barber-Greene Snow Loader can more than equal the strongest efforts of one hundred husky shovelers.

And the snow-hungry B-G needs no time out for rest, meals, bad weather or sleep. One B-G in Boston cleared streets for 112 hours—six days—without so much as a stop to "stretch its back."

B-G's open traffic days sooner. With them, actually thousands and thousands of dollars—that are shoveled away in snow—can be saved, and spent for paving or repairs.

One Barber-Greene Snow Loader cut snow costs 56% for the City of Boston. It actually paid for itself in 14 days. One of its B-G's saves more than $10,000 of the City of Boston's street and alley appropriation every year.

The Boston Elevated Railway states that Barber-Greenes cost them 57c per cubic yard of snow removed. Their 4 B-G's saved over $47,000 in one season—paying for themselves twice over. 10 Barber-Greenes keep their snow costs even lower now.

We would like to tell you how a great many other cities are saving their street and alley appropriation for better things than snow storms. "Modern Snow Removal" contains accurate and actual cost records of Barber-Greenes in action. Send for it today.

One B-G can fill all of these trucks in less than that many minutes—and keep doing so, as long as the snow lasts

1928 CONVENTION and ROAD SHOW
AMERICAN ROAD BUILDERS ASSN.
JANUARY 9TH–13TH INCLUSIVE
CLEVELAND, O.

BARBER-GREENE COMPANY, 515 W. PARK AVE., AURORA, ILLINOIS

Barber-Greene

Snow Loaders

Representatives in 50 Cities

DISC FEED LOADERS — VERTICAL BOOM DITCHERS
STANDARDIZED PORTABLE AND PERMANENT BELT CONVEYORS
SNOW LOADERS — CAR UNLOADERS — COAL LOADERS

Yes—we should like you to mention THE AMERICAN CITY.

INTERIOR OF THE NEW WOONSOCKET, R. I., CENTRAL FIRE-ALARM OFFICE

New Fire-Alarm Central Office at Woonsocket, R. I.

The Gamewell Co., manufacturers of fire-alarm and police-signal systems, Newton Upper Falls, Mass., have recently completed the installation of Gamewell equipment in the fire-alarm central office in Woonsocket, R. I. Woonsocket has a population of 43,496 and a fire area of 5,632 acres. The equipment for the Woonsocket fire-alarm central office includes one 24-circuit protector board; four 4-circuit box line relay boards; one 8-circuit storage battery switchboard; one 4-circuit primary alarm board; and one 4-circuit secondary alarm board; one terminal and cross-connecting board; one master clock; one fast and slow time transformer; one 12-circuit motor wound repeater; one 2-dail, 4-number manual transmitter; one box line recording set, consisting of six 4-circuit registers, six time and date stamps, and six Peerless take-up reels; two motor generator sets; one gasoline generator set; 1,000 cells storage batteries; four 120-inch, 4-shelf metal battery racks; and one motor generator control panel.

Glose Made Sales Manager

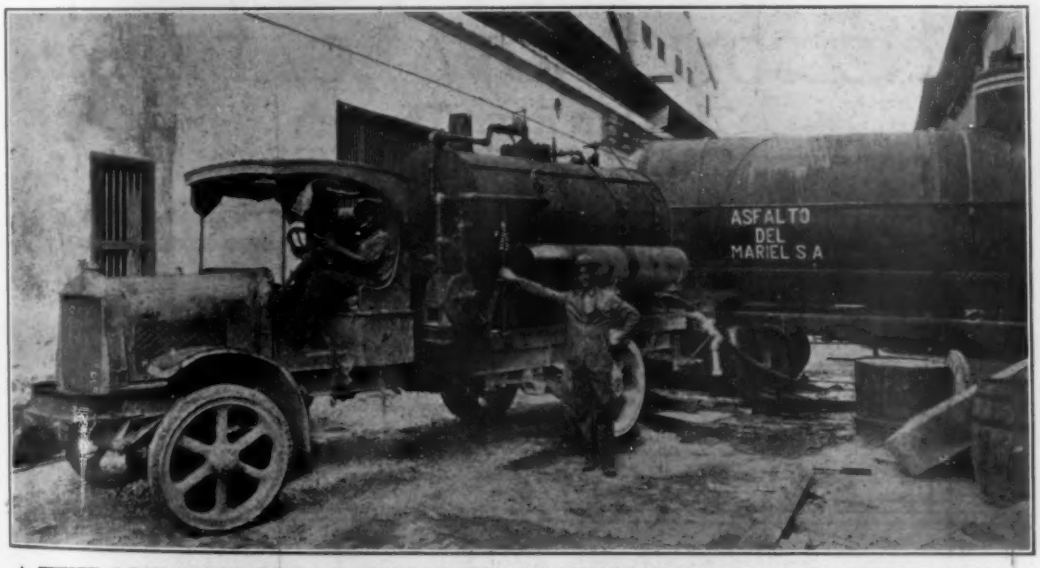
The National Steel Fabric Co., Pittsburgh, Pa., has announced the appointment of Robert L. Glose, formerly sales agent for the company, as Sales Manager. Charles C. Mercer, formerly Sales Counsel, was made Advertising Manager. William H. Shaffer, Jr., will continue as Dealer Sales Manager.

Badger Representatives

The Badger Meter Manufacturing Co., Milwaukee, Wis., has announced the apopintment of Frank Stich, of Milwaukee, and B. G. Dow, of Elmira, N. Y., as members of the Badger sales organization. Mr. Stich, who will be connected with the home office at Milwaukee, has had sixteen years' experience as a member of the Milwaukee Water Department. Mr. Dow, who will operate at the New York office, has had many years of sales experience in mining and public utility fields.

American-La France Acquires Foamite-Childs

The American-LaFrance Fire Engine Co., Elmira, N. Y., has acquired the assets and good-will of the Foamite-Childs Corporation of Utica, N. Y., and the business of the two companies has been combined under a single corporate identity known as the American-LaFrance and Foamite Corporation.



A WHITE 5-TON TRUCK WITH 800-GALLON HVASS ASPHALT PRESSURE DISTRIBUTOR OWNED BY THE CUBAN DEPARTMENT OF PUBLIC WORKS AND USED IN THE PROVINCE OF MATANZAS

does the work of a hundred men

Nothing Stops

NELSON SNOW LOADERS

They Cut Right Through SNOW, SLUSH and ICE

No snow too powdery, no ice too hard. Nelsons dig right in, down to street level. A load a minute in fresh snow or two minutes in frozen snow.

No wonder New York has made a record for itself with 36 Nelsons on the job, all winter.

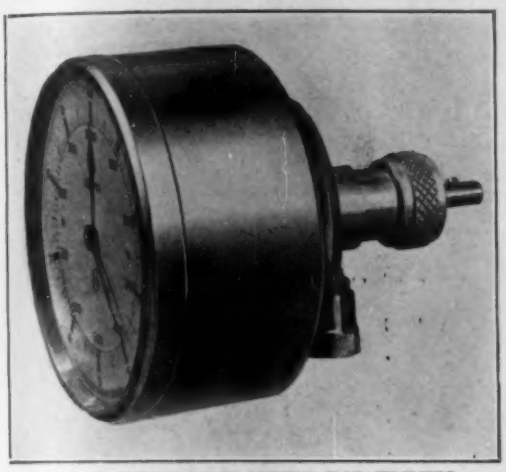
Get a NELSON . Use it all winter, then put it to work digging and loading ashes, coal, earth, gravel or sand.

N. P. NELSON IRON WORKS, Inc., PASSAIC, N. J.

Unique Machine Tells Time Truck Runs

Municipal departments and contractors, particularly, are interested in knowing just how long their motor trucks are actually operating throughout the day, week, month or year, and they also wish to know the length of time that cranes, hoists, tractors and construction equipment are really in operation.

The Hasler Tel running-time meter sold by R. W. Cramer & Co., Inc., 136 Liberty Street, New York, makes this possible. This clock-like attachment is mounted on any rotating member of the machine and registers the total time the machine is operating from the time the unit is attached, without the need of winding or replacing charts. The total elapsed operating time is read directly



THE RUNNING-TIME METER FOR TRUCKS

from the face of the Hasler meter. It registers and totalizes the elapsed operating time accurately and dependably, irrespective of the speed of the machine on which it is installed and irrespective of the direction of rotation or variation of direction of rotation. The manufacturers state that it is unaffected by vibration, magnetism, gravity, or extremes of temperature.

The running-time meter weighs only 28 ounces and measures 3½ inches in diameter and is 2½ inches deep. The unit cannot be tampered with and it is impossible to advance or retard the registration of time or to augment or diminish the accrued total. It is made in three sizes, the first with the dial calibrated to read up to 100 hours and repeat. This unit can be read directly to 3/5 of a minute and by estimation to 1/5-minute. The second type registers up to 1,000 hours and repeat, and can be read directly to within 6 minutes and by estimation to 2 minutes. The third registers up to 10,000 hours and repeat, and can be read directly to 1 hour and by estimation to within 20 minutes.

An Efficient Traffic Marker

A low-priced, efficient traffic marker that has small installation and maintenance cost and is effective, neat and durable, is being manufactured by the Betts Foundry and Machine Co., Warren, Pa. The many cities now using these markers have been practically free of accidents at street intersections—some cities finding that better results are obtained by placing two or three markers on certain corners. By placing more than one marker on a corner the entire square is open to cars in turning the corners, which is necessary on narrow streets.

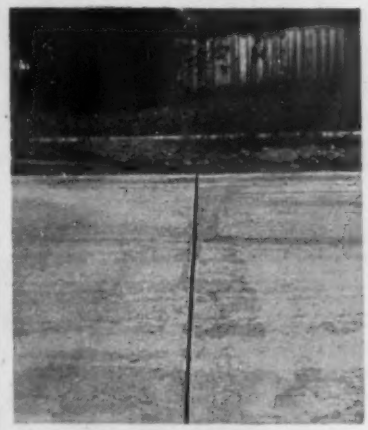
Lovenberg Represents Mathieson in New England

The Mathieson Alkali Works, Inc., 250 Park Avenue, New York, has announced that F. H. Lovenberg, formerly in charge of the St. Louis district sales territory, has been assigned to the New England district sales office, Providence, R. I., replacing C. J. Clegg, whose resignation has been accepted.

A Hand Hoist Body for Garbage Collection

A steel watertight dump-body with a capacity of 2 cubic yards water level, has been developed by the Ditwiler Manufacturing Co., Galion, Ohio. The Model GG-1 hand hoist body illustrated has a length of 108 inches, a width of 60 inches, and a depth of 18 inches. Steel covers may be furnished as additional equipment if desired by the municipal department.

This body, which can be readily used for handling refuse, is low enough to permit easy loading, and its shape and height of hand hoist gives it efficient dumping. The watertight construction eliminates the most undesirable feature of garbage transportation.



No Water Gets Between These Slabs

SEALTIGHT *The Perfected Joint*

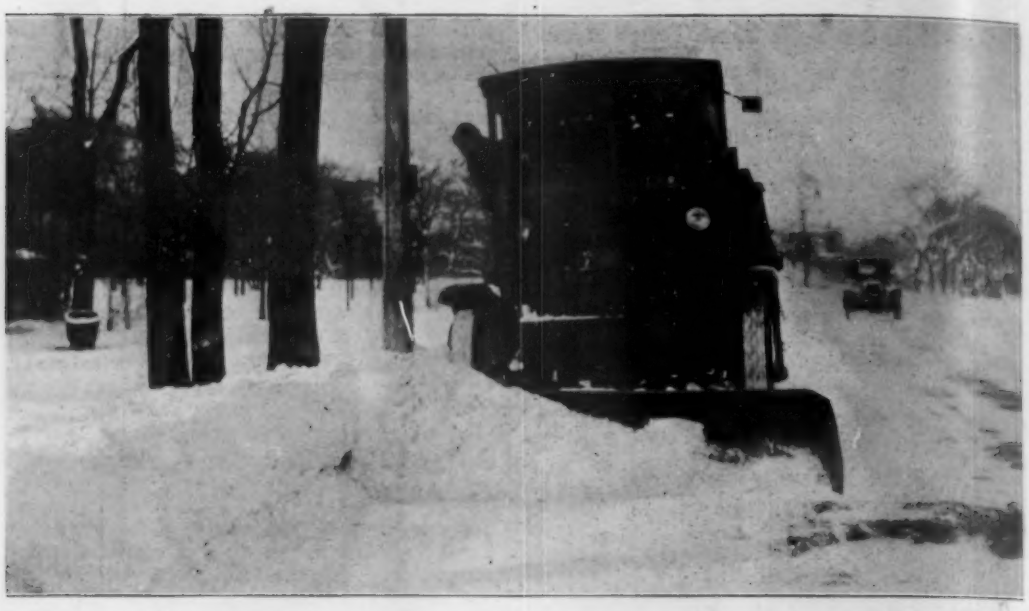
prevents the entrance of water, sand and pebbles or other foreign matter into the expansion gaps between two slabs of concrete.

Sealtight adheres to the sides of the slabs, sealing the joint perfectly. And Sealtight stays in the joint—does not run out at the top where traffic will carry it away.

Sealtight is made of a mixture of high-grade pure blown petroleum asphalt, specially blended for this product, and a long, flexible vegetable fibre filler. With this unusually tough fibre Sealtight is reinforced throughout and requires no reinforced sides.

Make the Road Right —Use "Sealtight"

W. R. MEADOWS, INC.
ELGIN, ILLINOIS



Are You Ready for the Next Storm?

76 of the leading cities in the snow area use Baker Snow Plows. 16 State Highway Departments, hundreds of counties, road districts and towns use Bakers. They were always ready for the next snowstorm with dependable snow movers. Year after year Baker Snow Plows are bought because of the good work they did the winter before.

Select your plow from the Baker line. Use the coupon below or wire us for information now.

The Baker Manufacturing Co.
503 Stanford Ave. Springfield, Ill.

Snow Plows for Motor Trucks made in 10 models both "V" and blade types

BAKER SNOW PLOWS
FOR MOTOR TRUCKS AND TRACTORS

Please send literature
on Snow Plows for .....
(Give name and model of truck or tractor)

....., ..., ..., ...
Name *Address* *City* *State*

Yes—we should like you to mention THE AMERICAN CITY.

Index to Contents of this issue, page 75

14" deLavaud Line at Loredo Texas

deLavaud Centrifugal Cast Iron Pipe in large diameters

OVER two and three quarter million lengths of deLavaud centrifugal pipe are now installed, in diameters from 4" to 20".

The many satisfied users find that the ease of handling deLavaud pipe is particularly true in the larger sizes—on account of its self-centering bell and its lighter weight which, of course, is proportionately greater as the size of the diameter increases.

Write for special literature covering the manufacture and use of deLavaud centrifugal pipe.

United States Cast Iron Pipe and Foundry Company

General Offices
Burlington, New Jersey

SALES OFFICES

Philadelphia, Chicago, Birmingham, Buffalo, Cleveland, New York, San Francisco, Pittsburgh, Dallas, Kansas City, Minneapolis

Index to Advertisements in this issue, page 132

LITERATURE ON CITY PROBLEMS

THE AMERICAN CITY should always be mentioned when writing for this material which is furnished free of charge. Officials who check over these items each month and write for such printed matter as interests them will find this a convenient way of keeping their information files up to date.

NEW TWO-CYLINDER ENGINE WITHOUT VIBRATION

There are nine new features of the newest two-cylinder Novo engine, which is without vibration, has four Timken roller bearings that assure perfect alignment of both crank and take-off shafts, end lubrication worries, and lengthen the life of the engine. You can learn about these features from the Novo Engine Co., 204 Porter St., Lansing, Mich.

SNOW REMOVAL AT LOW COSTS

The North hydraulic digger, which loads 300 to 500 yards of piled snow per day, is substantially built, easy to operate, and powered by Fordson, has no brakes or clutches to get out of order, and is described in a free catalog of the W. M. Blair Mfg. Co., 3673 Michigan Ave., Chicago, Ill.

AN EFFICIENT PIPE-DRILLING MACHINE

A drilling machine which can be operated by two men, which has an automatic feed that facilitates work and prevents over-feeding the drill, and which will provide a quick, efficient and economical method of making lateral or branch connections, is described in a catalog of the Mueller Co., Decatur, Ill.

CHLORINE FOR WATER-WORKS

A product that has proved itself in every way equal to its highly important task of water chlorination in municipal water-works systems, is liquid chlorine in chlorine cylinders especially painted with aluminum, manufactured by The Mathieson Alkali Works, Inc., 250 Park Ave., New York. Descriptive matter is free.

HICKORY BROOM FIBER FOR STREET SWEEPING

Hickory broom fiber for street sweepers, which gives excellent service, is always uniform, and is the original and only American-made product for this work, is described in literature which the Huntsville Fiber & Veneer Works, Huntsville, Ala., will send free to interested city officials.

TRAFFIC SIGNS OF VARIOUS TYPES

Complete information and prices on Alumoyd street signs, zone markers and various types of traffic signs, cast of alumoyd metal, may be secured without obligation from the Alumoyd Sign & Signal Co., Michigan at 11th St., Chicago, Ill.

REFUSE DISPOSAL PLANTS

The C. O. Bartlett & Snow Co., 6220 Harvard Ave., Cleveland, Ohio, has just issued a new 24-page book that describes the principle of the Sterling destructor and several important Sterling plants. The book, which is richly illustrated and non-technical, may be secured on request.

DURABLE FOUR-WAY ENAMEL STREET SIGNS

The heavy plate iron four-way street signs of the R. Hardesty Mfg. Co., Camps St. and Twelfth Ave., Denver, Colo., which are covered with black bicycle enamel baked on the plate and have letters painted with bright, durable, non-tarnishing aluminum, are completely described in an illustrated booklet, "Signs of the Times," which may be secured by interested municipal officials free on request.

MAIN-LINE METERS FOR WATER-WORKS

R. W. Sparling, 945-951 N. Main St., Los Angeles, Calif., will gladly send literature and prices to water-works officials and others interested in the Sparling velocity type main-line meter, which is simple to install, stands up under hard usage, requires no expensive servicing or upkeep, and brings to light any losses or leakage in the water system.

STANDARDIZED TRAFFIC SIGNS

Following the National Highway and Safety Conference's recommendation for standardization of traffic signs for highways, the Essco Mfg. Co., Peoria, Ill., is manufacturing a line of signs constructed along the standardized shapes and designs for cities, towns and villages. These are described and priced in an illustrated circular which is available to city and county officials.

ZONE PAINT FOR STREET MARKING

A zone paint for street marking that dries in six minutes and is famous for its wearing qualities is described in a booklet issued by Hanline Bros., Baltimore, Md. Write for this free booklet and quotations for your city job.

CONCRETE SEWER PIPE FOR PERMANENCY

Concrete sewer pipe that makes permanent, low-cost sewers, is built locally, is easier to lay, and comes in sizes of 24 to 108 inches, is manufactured by the Independent Concrete Pipe Co., Indianapolis, Ind., which will be glad to send details to interested parties.

SCREENS THAT MAKE WATER WELLS EFFICIENT

Greater efficiency is possible by using screens that allow the maximum amount of water to be developed from wells ending in sand or gravel, and that will not clog or corrode. These screens are manufactured by Edward E. Johnson, Inc., 2304 Long Ave., St. Paul, Minn. Write for catalog.

ONE-HALF- TO THREE-BAG MIXERS

Catalog and prices will be supplied by The Jaeger Machine Co., 215 Dublin Road, Columbus, Ohio, on its tilter, which is a moderate-priced mixer that is claimed to outwear and outmix any mixer of equal size.

GOLF-COURSE MAINTENANCE MACHINES

Descriptive literature on the Staude golf-course maintenance machine, including the Staude general-utility golf-course tractor, slip-on body, three-unit mower hitch, and three 30-inch cutting units, to make a tractor out of a Ford truck for use on golf courses, may be secured from the E. G. Staude Mak-A-Tractor Co., 2670 University Ave., St. Paul, Minn.

SEWAGE SLUDGE DIGESTION

Every official interested in sewage disposal should secure a copy of the booklet on difference in behavior of Imhoff tanks, printed by the Chemical Foundation, Inc., New York, and distributed by the Pacific Flush-Tank Co., 4241 E. Ravenswood Ave., Chicago, Ill. This booklet contains papers by Harrison P. Eddy, Boston, Mass., and Dr. William Rudolfs, New Brunswick, N. J., and gives valuable instructions as to the maintenance and operation of Imhoff sewage tanks.

BALL-BEARING CENTRIFUGAL PUMPS

The Worthington Pump & Machinery Corp., 115 Broadway, New York, has issued Bulletin W613 on Worthington high-efficiency centrifugal pumps, describing the pumps in detail and telling how 10,000 pump inquiries were analyzed to determine the heads and capacities most commonly specified by pump users.

STEAM TURBINES FOR AUXILIARY UNITS

Bulletin 1202 which may be secured from the Dean-Hill Pump Co., Anderson, Ind., describes the Dean-Hill Wait type steam turbine, which is especially adapted to meet the requirements of modern plants using high pressure and temperature steam.

A TRUCK WITH SCRAPER AND SNOW-PLOW

The new Duplex road-building and maintenance truck, built by the Duplex Truck Co., Lansing, Mich., combining a 3-ton Duplex chassis with 3-yard dump body, a Monarch road scraper and Wausau Universal snow-plow, is completely described in literature which may be obtained from the Duplex Truck Co., Lansing, Mich.

STANDARD Sure Stop MARKER

San Antonio Is Solving Her Traffic Problems

MOST everyone knows that San Antonio, Texas, is noted for three things—her wonderful winter climate, beautiful homes, and the historical Alamo.

The executives of this wonderful city of nearly 250,000 people do not jump to hasty conclusions,—but when San Antonians do things they generally do them *right.*

It was almost a foregone conclusion, therefore, that when San Antonio decided to install the *through boulevard* system that City Purchasing Agent James Simpson, aided and abetted by Police Chief Miller and Traffic Captain Klockenkemper, should decide on Sure-Stop Traffic Markers against a large field of competition. All of which gives us just another chance to call attention to an important fact—the motoring public of San Antonio is enthusiastic about them.

No other traffic signal made finds such instant acceptance and approval as the Sure-Stop—the flexible rubber marker installed in the center of the street that *flips right up again* when run over with no damage to the car, the driver or the signal.

There are so many superlative features to this remarkable traffic signal that we'll tell them to you in a booklet if you will send for it.

Standard Traffic Marker Co.

1717 East Second Street
Wichita, Kansas

The ALAMO

Literature on City Problems

You can secure any or all of these catalogs free of charge if you mention The American City

SAFE, ECONOMICAL WATER FILTERS

City officials should take advantage of the cooperation of the Norwood Engineering Co., Florence, Mass., and write for information and particulars of Norwood municipal filters, which are safe, efficient and economical, and have been installed and give satisfactory service in many leading cities.

RATE-OF-FLOW CONTROLLERS FOR FILTER OPERATION

For higher bacterial efficiency on your filter operation, the Simplex Valve & Meter Co., 6743 Upland St., Philadelphia, Pa., has developed rate-of-flow controllers that act direct, keep their adjustment, eliminate surging and breaking the filter bed, and have one set of moving parts, all-connected and acting together, insuring simplicity and freedom from adjustment.

SNOW LOADERS THAT CUT DOWN COSTS

Snow loaders that will save your city many times their cost by shortening traffic tie-ups and eliminating hand labor, and that operate at 1½ cents per cubic yard, are manufactured by the Barber-Greene Co., 515 W. Park Ave., Aurora, Ill. Send for catalog.

ROAD-SURFACING MATERIALS

A new booklet, "Texaco Road Surfacing Materials," which may be secured from the Texas Co., Asphalt Sales Dept., 17 Battery Pl., New York, describes methods of maintaining earth, sand-clay, gravel, macadam, shell, cinder and similar road surfaces with Texaco products.

AN INDEPENDENT GAS SYSTEM FOR SMALL TOWNS

The Illinois Bottled Gas Co., Inc., 608 South Dearborn Street, Chicago, Ill., will be pleased to furnish complete information regarding Protane bottled gas, which it has successfully installed in many small towns under municipal supervision for cooking and heating purposes.

SWIMMING-POOL AND BATHING-BEACH EQUIPMENT

This is the title of the new Catalog No. 5 just issued by the Hill-Standard Co., Anderson, Ind. This catalog describes and illustrates in color many types of water slides, buoys, life-lines, marine monsters, water-balls and surf-boards, landing-stairs, springboards, diving-towers and other equipment for pools and bathing beaches.

HEAVY-DUTY TURBINE METERS

Heavy-duty turbine meters that will deliver more water at a given pressure or the same amount of water with less loss of line pressure than ordinary meters of their size, and that will increase revenue by accurately checking your heavy services, are manufactured by the Badger Meter Mfg. Co., Milwaukee, Wis., which will send literature on request.

WATER-CLEANING ESTIMATES MADE FREE

The National Water Main Cleaning Co., Hudson Terminal Bldg., New York, will send free of charge or obligation estimates on cleaning the mains of your city, which by comparison with the price paid for new mains, is surprisingly small.

SANITARY GARBAGE DISPOSAL

Booklet No. 79 of the Pittsburgh-Des Moines Steel Co., 681 Professional Bldg., Pittsburgh, Pa., describes sanitary garbage disposal in an incinerator that operates at the unusually high temperature of 1,800 degrees F., and produces no objectional smoke or odor.

TRUCKS FOR SPEED AND HEAVY DUTY

Full information concerning the line of trucks of the International Harvester Co. of America, 606 S. Michigan Ave., Chicago, Ill., will be sent free by the company. This line includes a ¾-ton "special delivery"; 4- and 6-cylinder speed trucks, 1¼-, 1½- and 2-ton; and heavy-duty trucks to 5-ton size.

WORM-LOCKS ON METER-BOX COVERS

A catalog, "Ford Water Meter Settings and Accessories," will be sent free by The Ford Meter Box Co., Wabash, Ind. This describes, among other things, a worm-lock on meter-box covers that actually lifts the lid with the screw-jack action which breaks the seal of ice or dirt when the key is turned, and cannot be picked without the key.

A NEW SQUARE TERMINAL POST FOR FENCES

A new square terminal post that is unclimbable, has no fabric holding bands on which tramps can get a foothold, and is protective, strong, and good-looking, has been manufactured by the Anchor Post Fence Co., 9 E. 38th St., New York, which will gladly send descriptive matter on request.

WELL-STRAINERS AND DEEP-WELL PUMPS

If you are interested in obtaining satisfactory service from a tube well strainer or a deep-well pump for your city or town, A. D. Cook, Inc., Lawrenceburg, Ind., will be glad to furnish all particulars free of charge on its complete line.

FREE WRENCH FOR WATER METERS

The Buffalo Meter Co., 2719 Main Street, Buffalo, N. Y., offers to water-works departments free wrenches which can be used in replacing the stuffing-box on water meters. Just write to the company on your department letterhead, attaching this item, and specify to whom the wrench should be sent, and you will receive one of these wrenches without cost.

CONCRETE LIGHTING STANDARDS

Write to the Chicago Concrete Post Co., Lawrence, Lamon and Leland Aves., Chicago, Ill., for information regarding its concrete lighting standards, which are manufactured by a jogging, vibration process and 21,550 of which have been used by the city of Chicago because of their great strength, beauty of design and finish, and low cost.

PUMPS THAT MAY BE DRIVEN BY CAR OR TRUCK

Bulletin 56 of the American Steam Pump Co., Battle Creek, Mich., describes and illustrates the portable ditch pump that is driven by any car or truck motor direct through patented power take-off, handles to 750 G.P.M. without overloading the motor, and may be furnished with an automatic primer.

SURFACE TREATMENT FOR ROADS

If you are contemplating resurfacing your roads now before winter sets in, write to The Barrett Co., Ltd., 40 Rector St., New York, for information and prices of Tarvia for road construction, repair and maintenance. This treatment will fortify your roads against frost and snow and there will be no broken-up stretches in the spring.

YEAR-ROUND UTILITY FOR CRAWLER TRACTORS

Ten great features of the Cletrac crawler tractor of The Cleveland Tractor Co., Cleveland, Ohio, are described in literature which the company will be glad to send to interested city officials and engineers free on request.

FIRE-ALARM BOXES FOR PROTECTION

Write to The Gamewell Co., Newton Upper Falls, Mass., for descriptive and illustrative literature of its fire-alarm boxes, which give from thirty to fifty years' service and reduce fire-alarm protection costs to a minimum. This information is free on request.

CURING CONCRETE ROADS, STREETS AND BASES

This is the title of a new booklet issued by the Grasselli Chemical Co., Cleveland, Ohio, describing the use of R-B silicate of soda for curing and hardening concrete on state and county roads and city streets.

HOISTS FOR DUMP-TRUCKS

The Hydraulic Hoist Mfg. Co., St. Paul, Minn., will be pleased to send interested city officials information and prices regarding St. Paul hydraulic hoists, which have high dumping angle and low mounting, and require only occasional low cost repair, and insure quick operation.

A COLOR CARD OF MUNICIPAL PAINTS

The Tropical Paint and Oil Co., Cleveland, Ohio, has just issued a color card describing and illustrating Tropical street-marking paint, park-bench enamel, fire-alarm and hydrant enamel, and safety standard and lamp-post enamel.

CONCRETE LIGHTING STANDARDS

Joltite-Granilite concrete lighting standards, which have been selected for the big lighting job in Oak Park, Ill., and many other villages and cities where both quality and costs were determining factors, are manufactured by the American Concrete Products Co., 1245 Circle Ave., Forest Park, Ill., which will send literature on request.

NEW 6-CYLINDER, 2-TON DUMP-TRUCK

A new 6-cylinder, 2-ton dump-truck that has 4-speed transmission and selective gear ratios in the rear axle to apply the power without strain, 4-wheel Lockheed hydraulic brakes to make the greatest possible use of speed with safety, and a chassis built for the unusual stresses of dump-truck work, is described in literature of Graham Bros., Detroit, Mich.

STEEL NEVER FAILS

This is the name of an important fact-book of the American Institute of Steel Construction, Inc., 285 Madison Ave., New York, which includes data and experience of the Institute, and the development of a Standard Specification which is saving building owners and other taxpayers more than $30,000,000 a year, together with a Code of Practice.

A FIRST AID AND RESUSCITATION DEVICE

Catalog No. 3 of the Mine Safety Appliance Co., Braddock Ave., and Thomas Blvd., Pittsburgh, Pa., describes and illustrates the H-H inhalator, a resuscitation device that actually breathes life into victims of suspended respiration from gas asphyxiation and other causes, and that was developed by Drs. Yandell Henderson and Howard W. Haggard of Yale University, and tested and approved by the American Gas Assn. and the Assn. of Police and Fire Surgeons.

MATHIESON
Industrial Chemicals

Chlorination—an Accurate Measure of Community Progress

MORE and more, the social and industrial progress of a city is accurately measured by the modern efficiency of its water works system.

Not only are up-to-date methods of water purification—as exemplified, for instance, by chlorination—directly responsible for community health and safety. They have a direct influence upon community prosperity, as well, because there is no better asset for any community than an ample supply of absolutely pure water.

Municipal officials and water works engineers have long recognized the importance of Mathieson Liquid Chlorine and Mathieson container equipment as important auxiliaries in the efficient sterilization of water supplies.

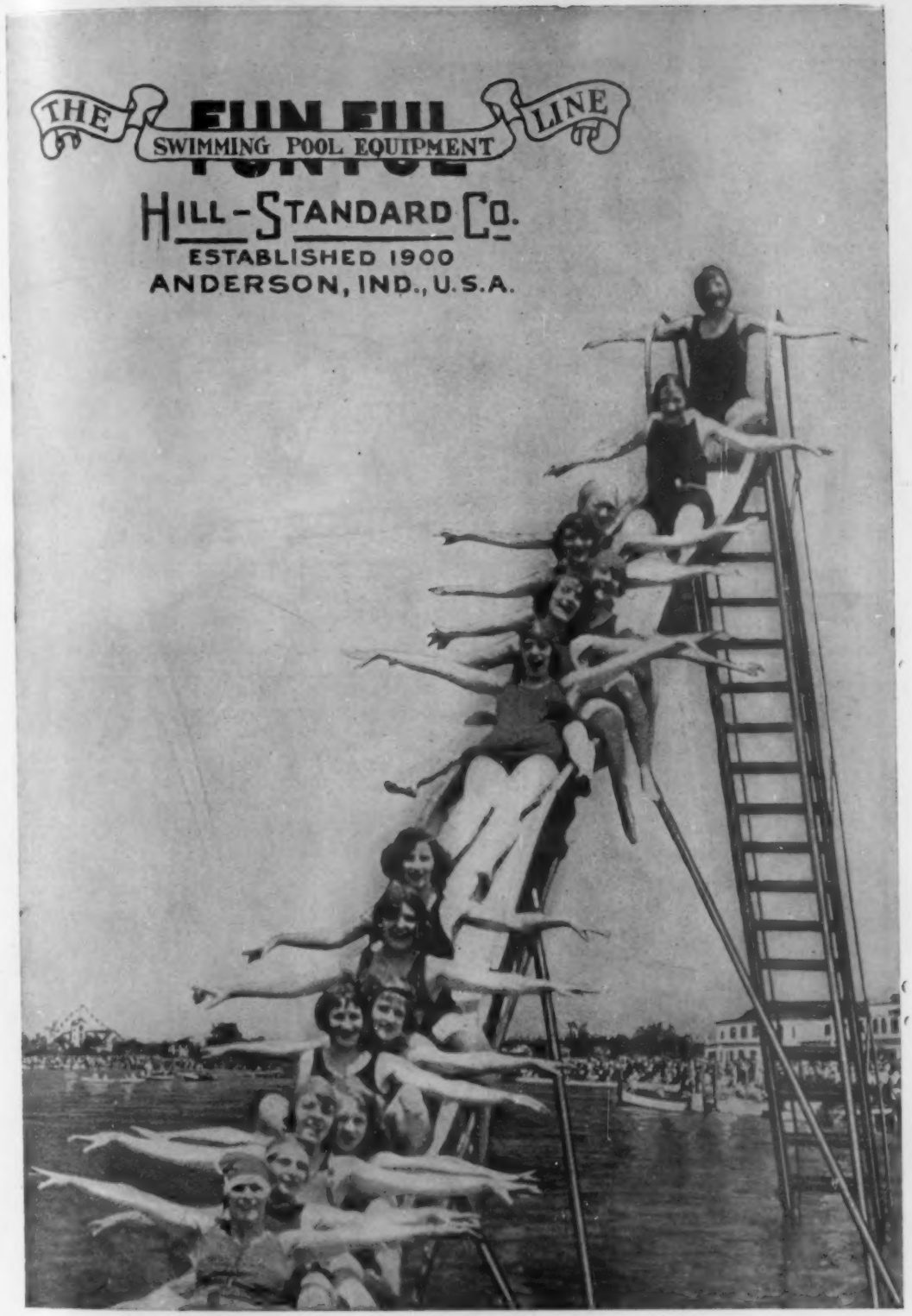
The Mathieson organization, as the world's largest shipper of Liquid Chlorine, offers a specialized service which includes special water works tank car equipment, expert traffic counsel, technical advice, together with a chain of emergency warehouse stocks throughout the country. This service is placed at your disposal the moment EAGLE-THISTLE Chlorine is specified.

CAUSTIC SODA
LIQUID CHLORINE
BICARBONATE OF SODA
MODIFIED VIRGINIA SODA
SODA ASH
BLEACHING POWDER
ANHYDROUS AMMONIA
AQUA AMMONIA

The MATHIESON ALKALI WORKS *Inc.*
250 PARK AVE. NEW YORK CITY
PHILADELPHIA CHICAGO PROVIDENCE CHARLOTTE CINCINNATI
Works: Niagara Falls, N.Y.—Saltville, Va.
Warehouse Stocks at all Distributing Centers

Deal Direct with the Manufacturer

Yes—we should like you to mention THE AMERICAN CITY.


THE
FUN FUL
LINE
SWIMMING POOL EQUIPMENT
PONTOL
HILL-STANDARD CO.
ESTABLISHED 1900
ANDERSON, IND., U.S.A.

SANITATION vs. DISEASE

IT is the civic battle now being waged by progressive sanitary engineering. A factor in this battle to eliminate urban disease is the treatment of sewage wastes. In this connection, Liquid Chlorine may be likened to a division of effective front-line troops. Its value in sewage treatment is acknowledged. Get the facts—"Liquid Chlorine in Sanitation." Copies gladly sent upon request to you and your friends.

Liquid EBG Chlorine

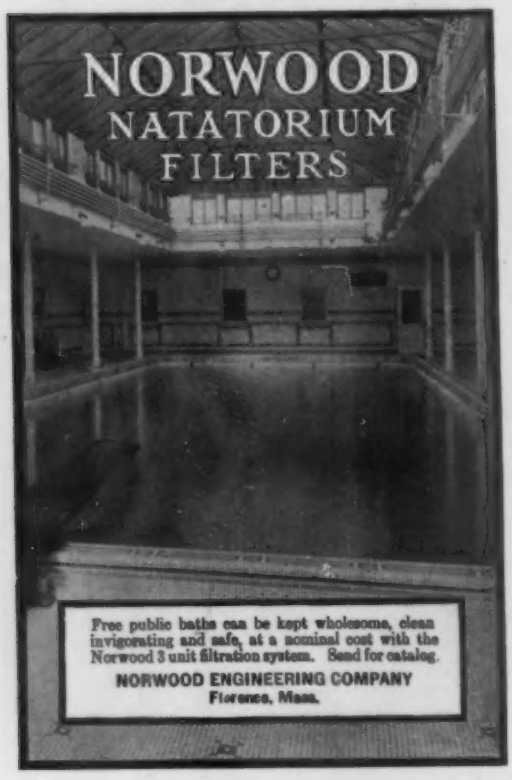
Look for the RED Cylinder

Electro Bleaching Gas Co.

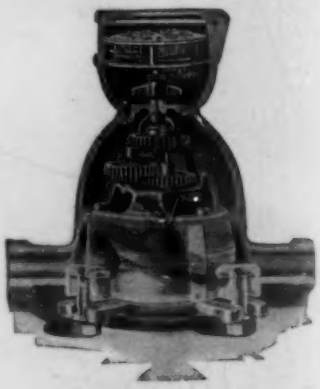
PIONEER MANUFACTURERS of LIQUID CHLORINE

Plant: NIAGARA FALLS, N.Y.

MAIN OFFICE: 9 East 41st St., New York


NORWOOD
NATATORIUM
FILTERS
Free public baths can be kept wholesome, clean invigorating and safe, at a nominal cost with the Norwood 3 unit filtration system. Send for catalog.
NORWOOD ENGINEERING COMPANY
Florence, Mass.

"WATCH DOG" WATER METERS



Inquiries Solicited

GAMON METER COMPANY

Main Office and Works

NEWARK, N. J.

CHICAGO 360 N. Michigan Ave.

SEATTLE 1410 L. C. Smith Bldg.

The offices of THE AMERICAN CITY, 443 Fourth Ave., N. Y., are headquarters for information on equipment for municipal work. If you want catalogs, prices or names of manufacturers, let us help you.

Ewing Galloway

The City of St. Louis

Selects

Four Dorr Traction Clarifiers

In the new Missouri River water treatment plant, four 150-foot Dorr Traction Clarifiers will be operated. Two of the machines will normally be used as pre-sedimentation units; the other two will be used for sedimentation of the softened water leaving the mixing basins.

Strong and rugged, but trim in appearance, Dorr Traction Clarifiers can profitably be used wherever the need for a sedimentation unit arises—in either sewage or water treatment work.

The powerful tractio drive pro pels the mechanism smoothly and surely. There is no heavy superstructure or large housing over the tank. All bearings are above the water level.

The choice of Dorr Traction Clarifiers for this important work at St. Louis followed exhaustive tests which demonstrated that large savings could be effected by Clarifier operation.

DORRCO

Send for Bulletin No. 6171

THE DORR COMPANY

ENGINEERS

247 PARK AVENUE NEW YORK CITY

DENVER
1009 17th St
LOS ANGELES
108 W 6th St
WILKES-BARRE
536 Miners Bank Bldg

CHICAGO
310 S. Michigan Ave
ATLANTA
1503 Candler Bldg.
JOPLIN.
319 Joplin National Bank Bldg.

TORONTO 330 Bay St

THE DORR CO. LTD
16 South Street London E.C.2

DORR G.m.b.H.
Joachimsthalerstr 10 Berlin W15

SOC. DORR et CIE.
126 Rue de Provence Paris 8.

INVESTIGATION TESTS DESIGN EQUIPMENT

ALUMINUM SULPHATE

FILTER ALUM

Lump Filter Alum
for
Solution Feed

Special Ground
for
Dry Feed

QUANTITY output and processes which protect the Standard Purity of this Company's product enable the user of Filter Alum to place his orders with General Chemical Company with implicit confidence as to quality and delivery. And he will find his good judgment confirmed by the majority of purchasers of this important product.

GENERAL CHEMICAL COMPANY
40 RECTOR STREET NEW YORK
Cable Address, Lycurgus, N.Y.
BUFFALO · CHICAGO · CLEVELAND · DENVER · LOS ANGELES
PHILADELPHIA PITTSBURGH · PROVIDENCE SAN FRANCISCO · ST. LOUIS
THE NICHOLS CHEMICAL COMPANY, LIMITED, MONTREAL

Cast Iron Pipe
for Water and Gas

Cast Iron Pipe and Special Castings, Bell and Spigot, Flange, Flexible Joint, Culvert, Milled and Plain End Tubes, Cylinders, Flanged and Bell and Spigot Fittings, High Pressure Fire Service Pipe, Warren Short Body Specials.

Sizes 2- to 60-inch

Pipe manufactured in accordance with standard specifications adopted and approved by water works associations and engineers.

Warren Foundry & Pipe Co.
Formerly
Warren Foundry and Machine Co.
Sales Bowling Green Building, New York City.
Offices: 201 Devonshire Street, Boston, Mass.

DIXON'S
Graphite Paints

Better and longer protection as well as lower cost per year of service are direct results of their use.

The pigment, flake silica-graphite, is unusual in its durability and water-repellent qualities. Being of flake formation, it expands and contracts with temperature variation without cracking or peeling.

Write for new color card No. 7-B, showing colors of Aluminum and Light Gray.

JOSEPH DIXON CRUCIBLE CO.
Jersey City New Jersey
1827—ONE HUNDREDTH ANNIVERSARY—1927

Its flexibility is an established fact

This Cast Iron Pipe Installation in Pittsburgh is being raised bodily to a new level of a re-graded street, without interfering with heavy traffic in the slightest.

THE strength and flexibility of Cast Iron Pipe lines with the Bell and Spigot Joint enable engineers to raise or lower such lines without interrupting the service in any way.

This is of the greatest importance, especially where an interruption to the water or gas service in industrial areas would result in a serious economic loss.

For permanence and low maintenance cost and adaptability to industrial needs Cast Iron Pipe has no equal.

This Association was established to be of service to you

Information regarding the various accepted methods of handling alterations and moving of gas or water mains will be gladly forwarded to you.

Its functions are:

1. Collecting and compiling data with reference to Cast Iron Pipe and fittings for all purposes.
2. Assisting engineers in solving difficult and unusual problems.
3. Educating the public by national advertising in the importance of having up-to-date waterworks.

—It has nothing to sell.

Engineers, municipal authorities and contractors are invited to write for special literature on the subject of water systems.

Of especial importance is a reprint of an article on the "two mains system." Send for a copy.

LL and SPIGOT JOINT—*accepted standard for underground construction*

THE CAST IRON PIPE RESEARCH ASSOCIATION

People's Gas Building, Chicago, Ill.

CAST IRON PIPE

—In continuous service for over 250 years

Satisfactory, Economical Garbage Disposal

Woodlawn, Pa.
80 Tons—24 Hours

THE "United States Standard" incinerator operates at the unusually high temperature of 2,000 degrees F. This insures the complete combustion of all refuse without objectionable smoke or odor. No low-temperature destructor will operate in such a satisfactory manner.

The "United States Standard" can be centrally located in a town since it is not a nuisance in the neighborhood. This reduces the length of haul necessary for the carts or trucks which is an important factor in the cost of garbage disposal.

If you are interested in garbage disposal, write for our Booklet No. 79. If you would like to discuss this question personally, one of our engineers will gladly call at your request.

Pittsburgh-Des Moines Steel Company

681 Professional Bldg. **Pittsburgh, Pa.**

SPARLING MAIN-LINE METERS

This Sparling Meter, mounted in steel pipe and fitted with 12-inch Register Extension, shows clearly the sturdy simplicity of the device. The register extensions are furnished extra, in any desired length of even feet. At the left is shown the simple, easily read register dial.

H. W. SPARLING

Power and Pumping Machinery
Water Measuring Equipment

945-951
No. Main St.
Los Angeles
Calif.

The Wellington
Destructor
Toronto, Ontario
Capacity
400 tons per day

Satisfaction Explained

Sterling Destructors have proved themselves by a service of perfect satisfaction that is easily explained.

The Sterling Mutual-cell Furnace design follows the basic laws of combustion. It assures a fire hot enough to consume both the waste (garbage and refuse) and every noxious odor without the addition of any fuel whatever.

Sterling furnace construction represents the finest in engineering skill and workmanship. Its materials are of the same quality as those of the better class of steel melting furnaces. The brickwork is laid up brick to brick. The whole furnace is securely bound by a rugged steel framework.

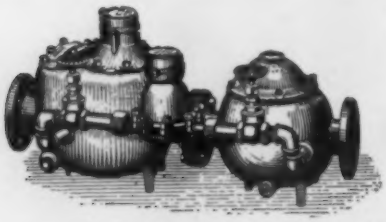
The high character of such an installation naturally involves a slightly greater initial investment. But it is an investment well made; one that justifies itself in longer life, lower upkeep, and freedom from offense.

Our new illustrated booklet tells the whole story. Write for a copy.

THE C. O. BARTLETT & SNOW CO.
6209 Harvard Ave. Cleveland, Ohio

Bartlett - Snow

REFUSE DISPOSAL PLANTS



Since 1868 the products of Union Water Meter Company have been regarded generally as the standard of perfection. Constructed on sound scientific principles, improved with the advance of time, the combined experience of nearly sixty years stands behind these manufactured specialties.

Nilo Compound Meter. Combination of Nilo Velocity Meter and King Disc Meter with Union Compounding Valve.

Measures flow that is too small for large type or in excess of delivery of the smaller meter. Perfect measurement of all water passing through it.

Catalog A-57 describing complete line of Union Meters sent upon request

Successful Since Sixty-Eight

Union Water Meter Company
Worcester, Mass.
New York: 50 Church Street
Philadelphia: 411 Bulletin Bldg.

UNION

Water Meters · Chronometer Valves
Easy Turning Stops · Pressure Regulators
Presses for Lining Pipe · Alarm Signals

Pure Water

We manufacture filters for all domestic industrial and municipal requirements.

For over twenty-five years Roberts Filters have been supplying pure, clean water.

Write for descriptive literature.

Roberts Filter Mfg. Co.
602 Columbia Avenue
DARBY, PA.

INTERNATIONAL
GRAVITY FILTRATION PLANTS

THROUGH the years, the International Filter Co. has been the first to adopt improvements—the first to discard features that have proved hindrances of progress. The result has been that International equipment has maintained its leadership; that it is first now as always.

INTERNATIONAL FILTER CO.
Water Softening and Filtration Plants
Works and General Office; 333 West 25th place, Chicago

New York Pittsburgh San Francisco
Canadian International Filter Co., Ltd., Toront

Van Gilder Water Meter
"The Meter with a Conscience"
Runs in Oil.
Lubrication Plus

This meter not only has the gear train running in oil, but even the register itself is submerged in a pure white oil protected by unbreakable glass on a dirt-and-moisture-sealed register box.

Wear proof—Corrosion proof—Always readable

VAN GILDER WATER METER CO.
PLEASANTVILLE NEW JERSEY
"Gateway to Atlantic City"

The NASH DISC METER

(Accurate—Dependable)

Some Particulars That May Interest You

The Disc principle for measuring water was perfected in 1887 by Dr. L. H. Nash (at that time our Chief Engineer); and we were the first in this country to apply for a patent on this type of meter. NASH meters have been on the market since 1888. The NASH of today embodies all the worthwhile improvements that have been developed since then, and is a thoroughly modern and reliable piece of water-works equipment. Its accuracy and endurance records are second to those of no other disc meter.

The case of the NASH is entirely of bronze, the two sections joined by six steel bolts, with a composition gasket at the joint. The measuring chamber is also of bronze; it has a friction joint, and can easily be taken apart for cleaning or examination.

The disc is large and extra slow-moving. It is perfectly balanced, and being conical in shape, is much stronger and moves more freely than a flat disc of the same size.

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The NASH frost feature is especially good. It is a breakable flange washer, which can be replaced with trifling trouble or expense, and which has been proved, by long test in service, to be one of the very best protections from cold-weather damage. The NASH is also made in a Non-Frost model.

Get acquainted with the NASH. Send for booklet.

Use the Coupon

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Non-Frost ☐
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299 Broadway, New York

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Will the New Year write ~~ PROFIT *on the ledgers?*

YOUR income, your profits, are dependent directly upon the efficiency with which your water meters are maintained. The meter is the measure of your income. It should be safely housed, and be available at all times for inspection. It should be easily removed for testing or replaced in a few moments. Your meter reader's time is money and should not be wasted in back calls.

Resolve~~~ to put your Meters in *Ford* Settings in 1928!

Two principal types—single lid covers and double lid covers.

Ford Water Meter Settings place your meters at the curb where all the water entering the property is measured, where they are safe from freezing, hot water damage or fire. The Ford Worm Lock prevents tampering and raises the lid when unlocked. Meter readers can read more "Ford set" meters per day and they are never tempted to enter fictitious readings to save call-backs.

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The FORD METER BOX Co.

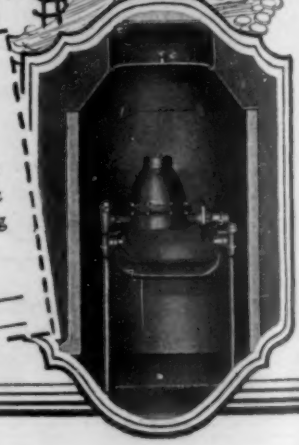
mail this *Wabash-Indiana*

The Ford Meter Box Co.,
Wabash, Indiana

Send me your illustrated catalog and more information on Ford Water Meter Settings. I am interested in ____single lid covers. ____double lid covers. ____Ford Yokes, ____Ford Grips, ____Meter Testing Machines, ____Ford Ram's Horn, ____Type S Boxes.

Name _____

Address _____



To all
our good friends
the world over
Merry Christmas
TRIDENT
TRIDENT METERS "The Cash Registers of the Water Works Field" LAMBERT METERS
NEPTUNE METER COMPANY THOMSON METER CORPORATION
50 EAST 42nd STREET, NEW YORK CITY.

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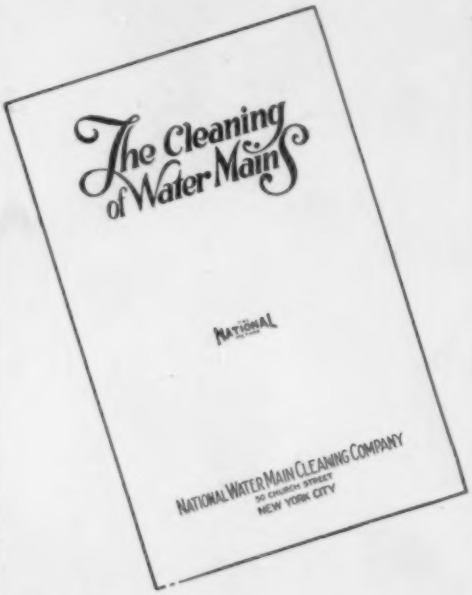

SOME time soon, if not now, you will want this booklet. Write for your copy now. It will give you the answer to the question, "Does pipe cleaning pay?"

NATIONAL WATER MAIN CLEANING COMPANY

BURT B. HODGMAN, Chief Engineer

Hudson Terminal Bldg. New York

THE NATIONAL METHOD

Security Sewer Rod

Security Rods are made from second-growth hickory, with malleable iron couplings swedged or shrunk down very tightly on the curved places at ends of sticks. Security couplings *cannot* come off.

Joint and unjoint easily and quickly —light weight—long runs easily made. No slack, but lend themselves to all practical bends.

They cannot buckle or uncouple in the duct.

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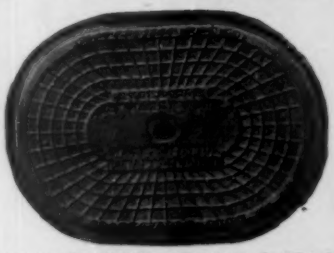

Patented self-locking device. Roomy cover, allowing meter to be easily removed.

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YOU can specify Badger Water Meters and know that they will perform dependably. They are designed and built to do their exacting duty year-after-year.

There is a Badger from the small 5/8 disc to the large 6 Turbine Compound, for every service.

Badger Meter Mfg. Co. MILWAUKEE WISCONSIN

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The offices of THE AMERICAN CITY, 443 Fourth Ave., N. Y., are headquarters for information on equipment for municipal work. If you want catalogs, prices or names of manufacturers, let us help you.

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Internal balance raises the Hersey Water Meter to an automatic revenue computor of the highest quality. No other meter has this feature.

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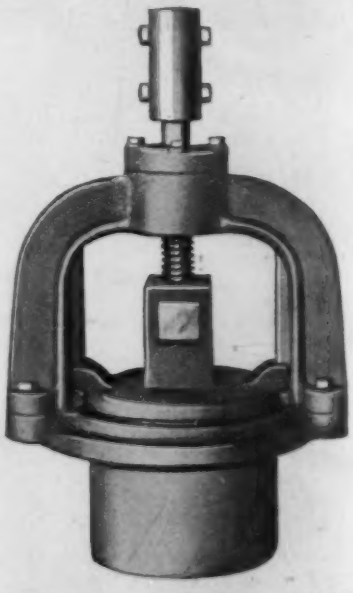

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Sluice Gates, Flap and Shear Gates

COLDWELL-WILCOX CO.
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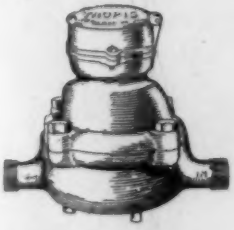
Machined first - *then* TINNED!

By Hot Dipping Method

BE sure that the meters you buy have working parts that are *machined first* then *tinned*. Meter parts that are machined *after* they are tinned are not protected from corrosion. Where machining cuts away the tin a raw composition surface remains that is not protected.

Every working part of every Pittsburgh Equitable Meter Company Water Meter is protected 100 per cent by hot tinning *after* the part is machined. This process assures longer life of working parts.



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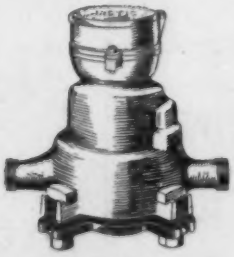

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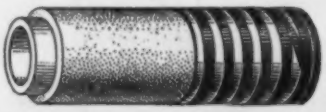

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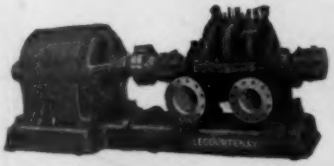

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"It makes a better joint"

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"THE BETTER METER"

The

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Do not fail to give this matter your consideration before placing your order. Note these special features:

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4—Gear train lubricated without removal from the meter.

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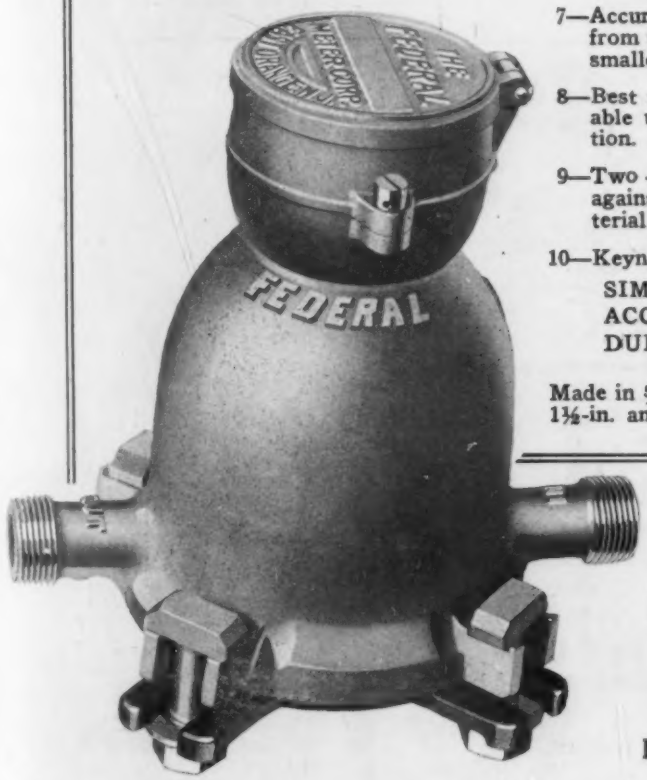
Made in ⅝-in., ¾-in., 1-in., 1½-in. and 2-in. sizes.



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The Eddy Valve has a number of distinctive features which it will pay you to study. For example: the gates are free to revolve on the trunnions, so as not always to seat in the same position.

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Shallow Wells Doubled Flow

All around Tonkawa, Oklahoma, shallow wells are slowing up and going dry; but in Tonkawa 10 Air Made Wells have doubled in flow in two years.

"Screen choke" is what makes your well slow up, and "screen choke" can't exist in an Air Made Well. The sand and mud are pumped out, and replaced with gravel. Your collecting basin gets bigger and bigger and you get more water as time goes on.

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SELL the water — don't give it away — or throw it away —

Every bit of water has a money value. Whether you know it or not, your city is losing revenue right now through wasted water — from leaky underground mains, leaky valves, hydrants and household services, and underregistering meters — *from one or all of these causes.*

Pitometer Water Waste Surveys have located all these various kinds of leaks for hundreds of cities. The cost of the Survey in each case has been small in comparison with the savings effected.

Stop the leaks. Stop throwing away money.

Write the Pitometer Company for free literature on this important subject of water waste prevention.

The PITOMETER COMPANY
Water Distribution Engineers
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MATHEWS FIRE HYDRANTS

REG. U. S. PAT. OFF.

Bronze-Lined Hydrant

If you want a hydrant that is dependable, long-wearing, frost-proof and automatically drained—

Try the Mathews

If you want a hydrant so simple in design as to assure the minimum of repairs and upkeep expense—

Try the Mathews

Mathews Fire Hydrants are made in both standard and high pressure types.—See our illustrated catalog. We also manufacture gate valves for all purposes, cast iron pipe (centrifugally cast or sand-cast), and fittings.

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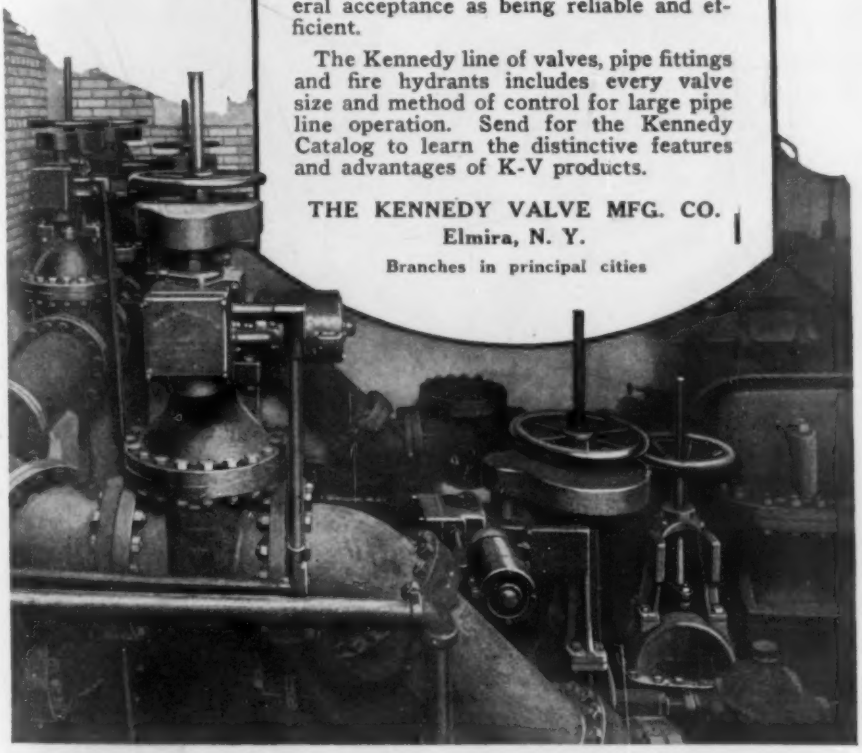
WATER supply and fire protection equipment *must* be thoroughly dependable. Only apparatus of the highest possible grade, meeting the most rigid requirements, can be used.

The wide use of Kennedy Valves and Fire Hydrants by villages, towns and cities throughout the country is therefore the strongest possible proof of their general acceptance as being reliable and efficient.

The Kennedy line of valves, pipe fittings and fire hydrants includes every valve size and method of control for large pipe line operation. Send for the Kennedy Catalog to learn the distinctive features and advantages of K-V products.

THE KENNEDY VALVE MFG. CO.
Elmira, N. Y.

Branches in principal cities



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and Sluice Gates have been a part of the development of the great water-works systems, filtration and sewage treatment plants for 75 years. During 1927 we have furnished valves and sluice gates to the following cities:

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MICHIGAN VALVE & FOUNDRY CO.

Established 1852

DETROIT, MICHIGAN

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The

Perfect Valve Inserting Machine

was designed to enable Water-Works Superintendents to install proper valves *without risk or inconvenience to consumers.* It is made in four sizes: No. 1 for inserting 4-, 6- and 8-inch valves; No. 2 for inserting 8, 10- and 12-inch valves; No. 3 for inserting 14-, 16-, and 20-inch valves; and No. 4, special for inserting 24-inch horizontal valves. The operation of this machine is "as simple as rolling off a log."

Write us for illustrated booklet No. 207

The

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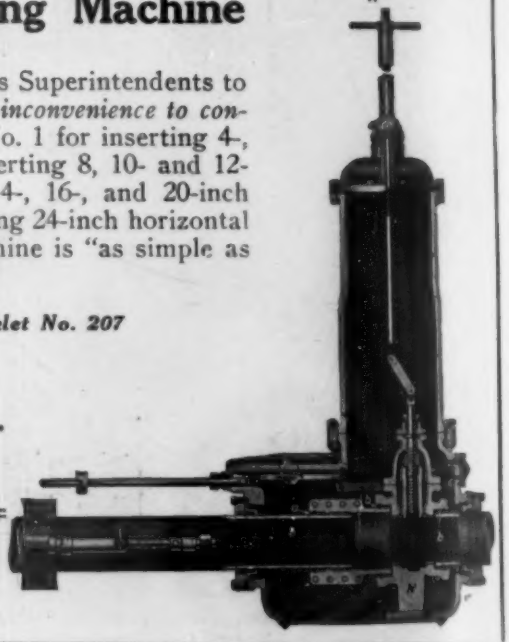

Makers of Smith Tapping Machines, Valves, Lead Furnaces, Pipe Cutting Machines, Gate Valves and Other Water-Works Specialties.

LUDLOW
The always dependable
HYDRANT

The records made by the Ludlow Hydrant in large cities, where many other makes are also used, show no other on the market with so small an up keep cost.

Every working part substantial—no complicated small parts—an absolutely dependable automatic drain valve at the extreme bottom that cannot be clogged—a newly patented device to prevent flooding of streets if the standpipe should be broken by team or automobile—all working parts easily removed through the top—

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We manufacture Manhole, Catch Basin and Sewerage Castings of all kinds. We make anything in Gray Iron. Write for our prices.

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Does not depend on water pressure to hold it in shape.

Is not injured by careless handling or backfilling.

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Has no harmful effect on any water.

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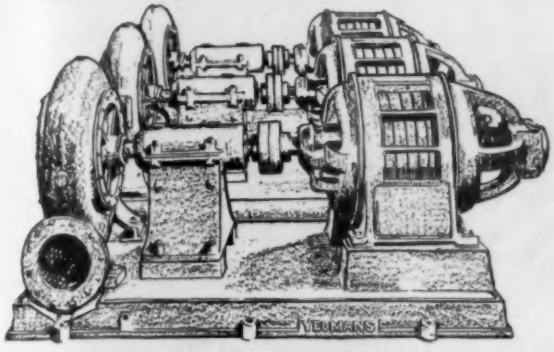
LYNN, MASSACHUSETTS

Nearly 300 Non-Clogging Sewage Pumps

No Screens to Clean



Three Yeomans Horizontal Non-Clogging Sewage Pumps with a combined capacity of 17,250 gallons per minute, built for the City of Gloucester, Mass.

In about two years, following the announcement of Yeomans NON-CLOGGING Sewage Pumps, nearly 300 machines have been installed. Not a single complaint due to clogging has been received and many of them are operating under most severe conditions.

Users know that Yeomans pumps have always been dependable, rugged and fool-proof, and the NON-CLOGGING machine is living up to this reputation.

Yeomans NON-CLOGGING Sewage Pumps will handle sewage containing solids without clogging. There are no screens required, no screens to clean. Their cost and maintenance are eliminated.

Recent NON-CLOGGING orders have been received from the following cities: Daytona Beach, Fla.; Gary, Ind.; Charles City, Iowa; Akron, Ohio; Chicago, Ill.; Milwaukee, Wis.; Haines City, Fla.; Gloucester, Mass.; Long Beach, Calif.; Chattanooga, Tenn.; Jacksonville, Fla.; Shreveport, La.; Bethlehem, Pa.; Dayton, Ohio; Detroit, Mich.

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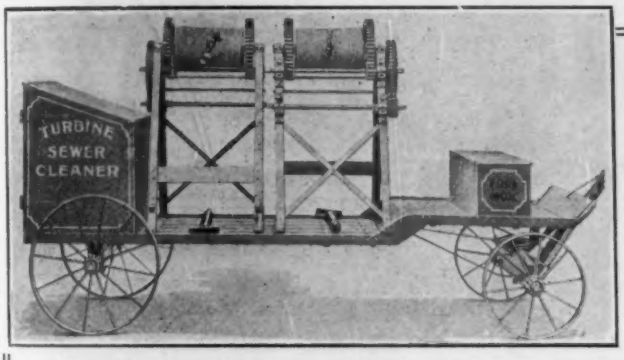
YEOMANS BROTHERS COMPANY

1417 Dayton St., Chicago

Est. 1898. Representatives in principal cities

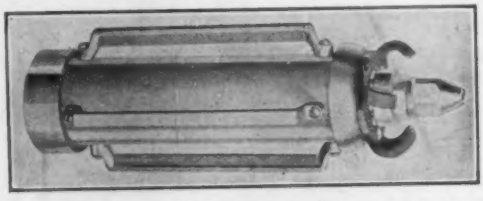


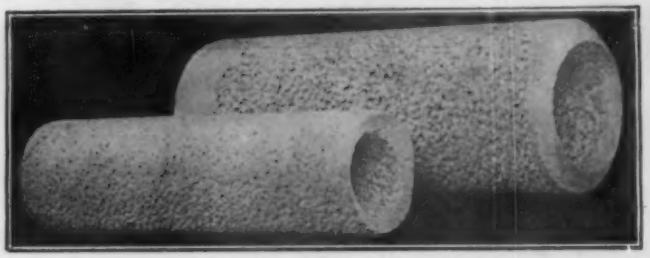
No Stopped Up Sewer is too difficult to yield to this TURBINE SEWER-CLEANING MACHINE

The Turbine will clean and scour a sewer under any and all conditions, even if stopped up to such an extent that a chain, cord or cable could not possibly be pulled through. To our standard machine we have added the Turbine Ferret, shown below, which has been used with great success in cleaning small stoppages, dead end connections, connections from catch basins to main sewers, and house drains.

The TURBINE SEWER-MACHINE CO.

MILWAUKEE, WIS., U. S. A.





Its ability to absorb water throughout its entire surface—

Its permanency under superimposed loads—

Its dependability under all kinds of severe climatic conditions—

Its tightly fitting concave and convex ends—

Make it the most efficient and economical drainage pipe that has yet been developed.

RAPID DRAINAGE PIPE

Write for booklet

WALKER CEMENT PRODUCTS, Inc.

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BALDWIN, L. I., N. Y.
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INDEPENDENT Concrete Sewer PIPE

Makes permanent, low-cost sewers Sizes, 24 to 108 inches. Built locally. Easier to lay. Write for details.

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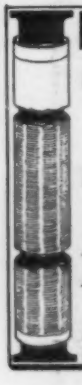
SIMPLEX VENTURI TYPE METERS

ACCURATE—RELIABLE—SIMPLE—EASY TO CHECK AND ADJUST

Data on Request

SIMPLEX VALVE & METER CO., 6743 Upland St., Phila., Pa.

Manufacturers of Meters and Controllers of Venturi Type; Gauges; Air and Vacuum Valves; Air Release Valves; and other Water-Works Devices.



If it is
A TUBE WELL STRAINER
or
A DEEP WELL PUMP

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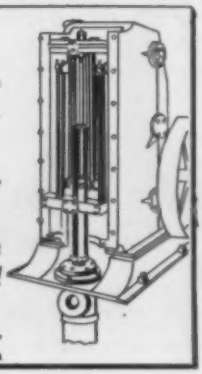

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The BELVEDERE New York

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CURTIS A. HALE, Managing Director BOOKLET FREE

TRADE "LEADITE" MARK

Registered U. S. Patent Office

Laid 10 miles of water main—and satisfactory in every particular!

—said a waterworks engineer of national reputation, referring to this installation

Here is the story:—

THE Second Taxing District, South Norwalk, Connecticut, U.S A., has just completed the installation of approximately ten miles of cast iron bell and spigot water mains, varying in size from 6" to 18". The work included the placing of about fifty cutting-in-tees on existing piping and their connection to new work.

Leadite was selected for jointing material after receiving competitive bids for laying with lead.

The total amount of the successful bids for all work, excepting the furnishing of the cast iron pipe, specials and valves, was as follows:

Lead Joints	$155,631
LEADITE Joints	142,535
Difference	$ 13,096
Saving in favor of **LEADITE**	8.4%

The work was performed by contractors experienced in the use of this material and was satisfactory in every particular.

Specifications required that after laying, the pipe should be tested for leakage under water pressures varying from 40 pounds to 115 pounds per square inch, and that the leakage should not exceed two gallons per 24 hours per linear foot of joint. The results of the tests were well within this limit.

This work was under the direction and supervision of Mr. Nicholas S. Hill, Jr., Consulting Engineer, 112 East 19th Street, New York, N.Y., U. S. A.

Leadite is used extensively by thousands of water works engineers, superintendents and contractors with excellent results.

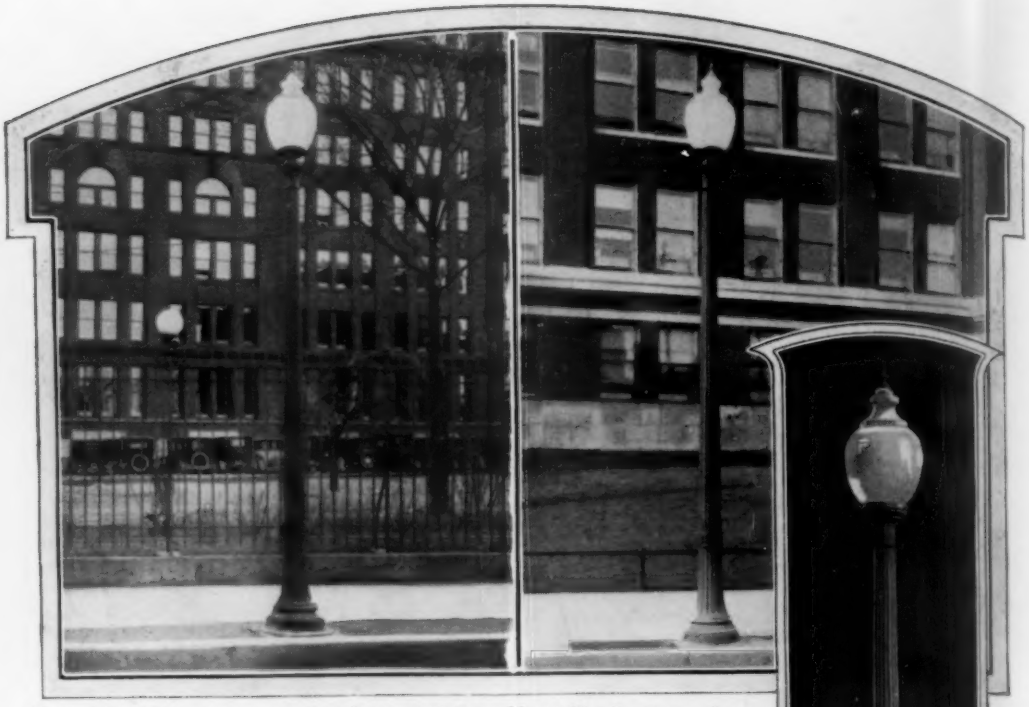
Specify and use **LEADITE** It saves at least 75%

Be sure it is **LEADITE** and accept no imitations

The pioneer self-caulking material for c. i. pipe. Tested and used for over 30 years.

THE LEADITE COMPANY . . Land Title Building . . PHILADELPHIA, PA., U. S. A.

NO CAULKING



Union Metal Design No. 807, equipped with G. E. Form No. 37 Novalux Unit and 118 Medium Alabaster Rippled Globe, installed on River Road, Schenectady, N. Y.

Left: In front of the general offices of The General Electric Co.

Right: In front of the general offices of The International General Electric Co.

Union Metal in the Home of The General Electric Company

IT is a significant fact that in Schenectady, N. Y., the home of The General Electric Co., over six hundred Union Metal Lamp Standards are to be found— far more than any other make — lighting the streets of that beautiful city. Moreover, orders are constantly being received for additional Union Metal Lamp Standards from The Adirondack Power and Light Co. for installation in Schenectady.

We consider it extremely complimentary that in this city in which more time and expert thought has been devoted to street lighting than perhaps in any other city in the world, the overwhelming preference should be for Union Metal Standards.

Cities all over the country can learn much from this selection.

THE UNION METAL MANUFACTURING CO.
General Offices and Factory, Canton, Ohio

Branches — New York, Chicago, Philadelphia, Cleveland, Pittsburgh, St. Louis, San Francisco, Los Angeles, Jacksonville

This new booklet— "America's Finest Families of Lighting Standards"— is yours for the asking. In it you will find the reasons why the expert street lighting thought of the country leans toward Union Metal.

Union Metal Design No. 1571 equipped with G. E. Form 8 Novalux Unit and No. 127 Globe. This Union Metal Standard is also extensively used in Schenectady, N. Y.

UNION METAL

THE ORIGINATORS AND LARGEST PRODUCERS OF

ORNAMENTAL LAMP STANDARDS

Mention THE AMERICAN CITY—it helps.

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No. 1572474
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Joints That Resist Wear

The old saying about a chain's being no stronger than its weakest link might well be paraphrased to read "A concrete road is no more enduring than its weakest joint."

An expansion joint that fails to function, that disintegrates with the changing weather, and that wears away under ordinary traffic conditions, exposes the concrete slabs to rapid erosion and cracking, and highways that should be enduring stretches of concrete soon become unsightly and dangerous roads of travel.

Servicised Expansion Joints do not wear away. They consist of the highest-grade materials; are carefully manufactured according to specified standards, and are guaranteed to function under all conditions.

Before you lay your next road send for the "Servicised" Catalog.

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WEBBED JOINT

A superior product, that offers increased rigidity without the loss of proper resiliency and resistance to traffic and wear necessary to the correct functioning of an expansion joint. Particularly desirable when only ⅜-in. or ½-in. fillers are installed, in view of the additional rigidity and strength produced by the webbed sides.

The webbed sides are formed by cementing small strips of saturated felt on the surface in a brick-like formation, the strips on opposite sides of the joint being placed in a staggered relation, so that each separation of the felt on one side is reinforced by felt directly opposite. The felt in this position maintains the rigidity produced by a solid sheet, without acting as a separator between the concrete and the mastic core. Even a slight compression causes the mastic to become exposed between the felt webs and come into contact with the ends of the slabs, thus reducing the tendency of the core to be forced out of the top.

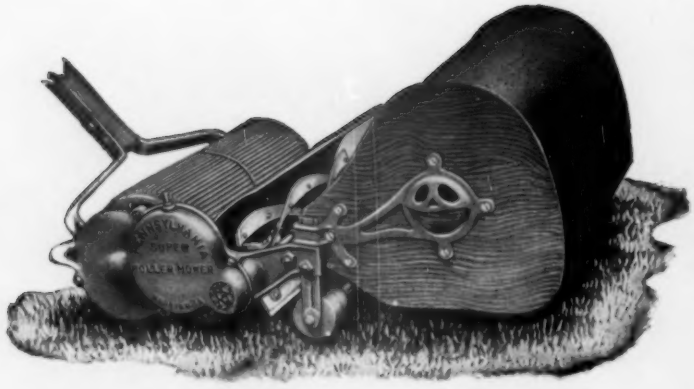
TYPE B. JOINT

Servicised Type B joint is built for resistance to wear and will keep the crevice filled longer than any other type of premoulded bituminous filler, regardless of construction or composition.

The seasoned, non-resinous flat fiber is incorporated to produce a shale-like construction which gives unparalleled rigidity to the tough rubbery asphaltic body. Finely divided felt fiber, uniformly interlaced throughout the bitumen, reduces the brittleness under shock, and resists mechanical disintegration. A net work of long cocoanut fiber, which in itself is free from decay, binds the mass just as the steel in reinforced concrete, thereby adding much mechanical strength to a highly resilient asphaltic material.

The bituminous material is refined at our own factory and a material having a penetration of 22-27 at 32° F. and a melting point of 240°-250° F. is obtained through the proper selection of fluxes and careful operating control. Without exception, Type B joint is made from materials whose value, strength and quality are not even approximated by those used by other manufacturers

SERVICISED REG. U.S. PAT. OFF. © 1918 **EXPANSION JOINTS**



The new 1928 model
Pennsylvania Super Roller Mower

Easier, quicker, closer, *surer* cutting is behind the country-wide demand for the PENNSYLVANIA Super Roller Greens Mower, which has been still further improved for 1928.

EASIER AND QUICKER—because it weighs only 55 pounds—its lubrication is Alemite—its ball and roller bearings of the highest quality, and its cut 18 inches wide.

CLOSER AND SURER—because its precision design and positive adjustment insure closer, more uniformly true cutting, and because PENNSYLVANIA Quality means uninterrupted service and lower maintenance costs.

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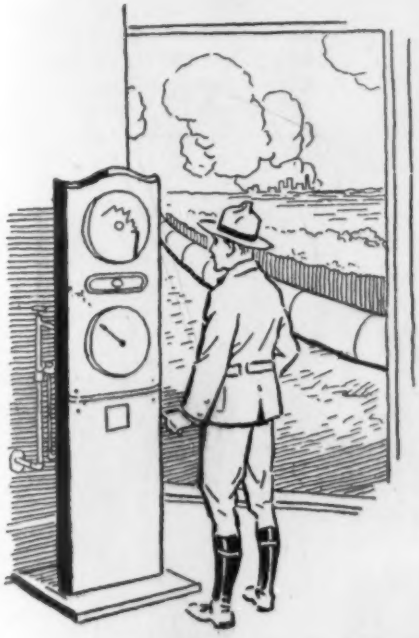
PENNSYLVANIA
Quality
LAWN MOWERS

In a Pipe Line *it is* Different!



It is NOT how many miles you can get per gallon

· BUT ·

How many gallons you can get per mile

Insure High Carrying Capacity with

LOCK JOINT
Reinforced
Concrete Pipe

Pressure Sewer
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THE STANDBY UNIT IS IMPORTANT—
MARION INSULATED WIRE & RUBBER CO.

Sterling High Duty Internal Combustion Engines

Sterling engines are accepted practice and over 500 installations are your guarantee that these engines are right.

THE LOWEST COST STANDBY

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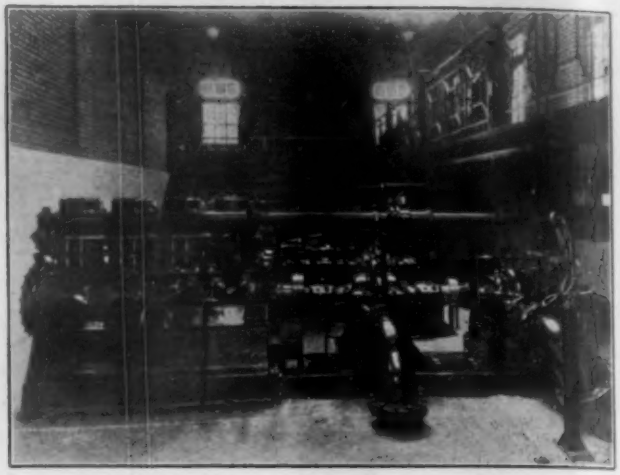

Belleville, Ont., 8-in. 2-stage DeLaval centrifugal driven by 8-cylinder 240-H.P. Sterling, furnished by Turbine Equipment Co., Toronto

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BUFFALO, N. Y., U. S. A.

10 to 3000 H.P. for standby and peak load
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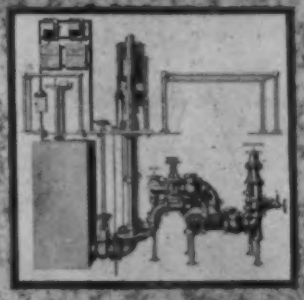

Sewage Never Touches Impeller
Strainers Are Cleaned Automatically
Pumps Operate Alternately
Any Capacity—Any Head

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BILGE-FIRE-HOUSE-VACUUM

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This 2-cylinder Novo Rollr Engine is running at 1800 r. p. m. The pencil standing on top remains *motionless.* That's what we mean by *"Vibrationless."* Send today for complete details.

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204 Porter Street
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The offices of THE AMERICAN CITY, 443 Fourth Ave., N. Y., are headquarters for information on equipment for municipal work. If you want catalogs, prices or names of manufacturers, let us help you.

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SERVICE BOXES
WITH *STAY-ON*
COVERS
Just what you have been waiting for . . . Interchangeable with "Buffalo" boxes . . . .
Ask for MONITOR
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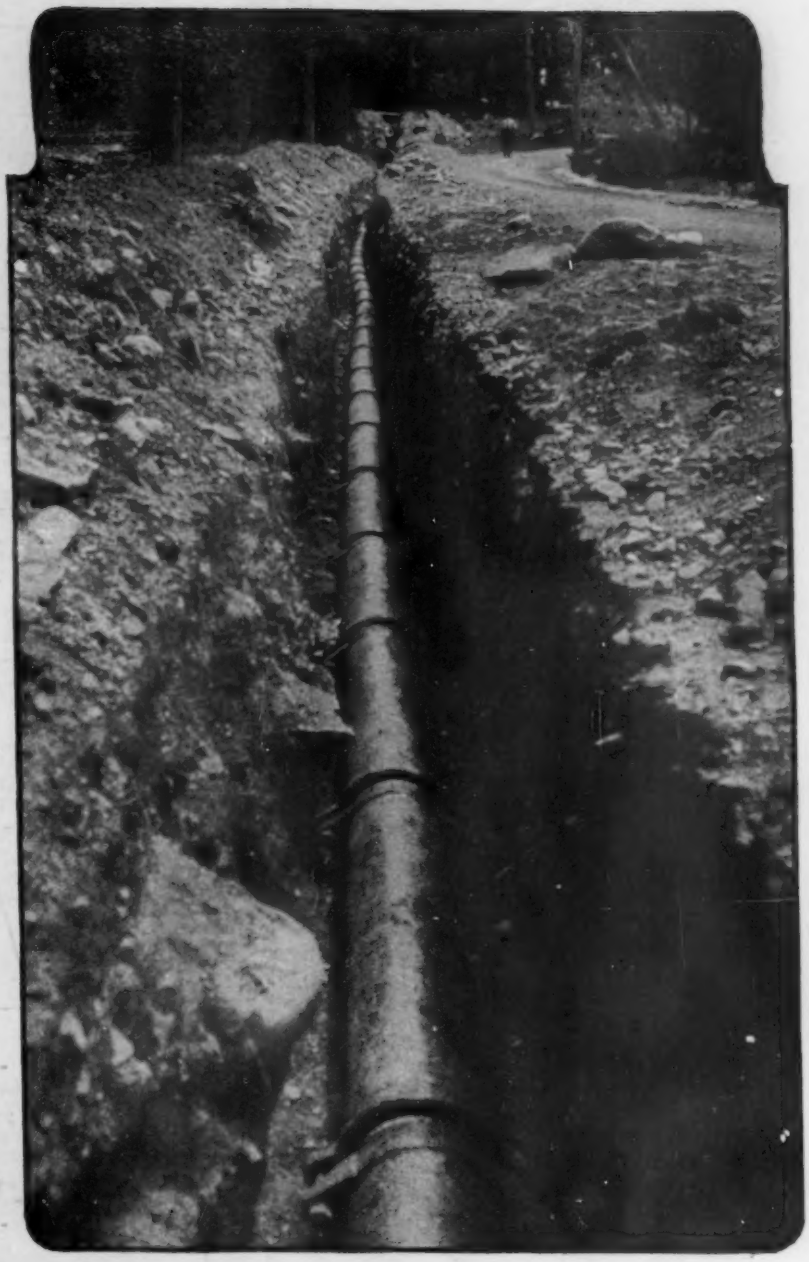

Easier
TO HANDLE
Quicker
JOINT-MAKING
Safer
IN SERVICE
!

UNIVERSAL CAST IRON PIPE
No bell holes to dig: No joints to calk
THE CENTRAL FOUNDRY COMPANY
Subsidiary of The Universal Pipe and Radiator Company
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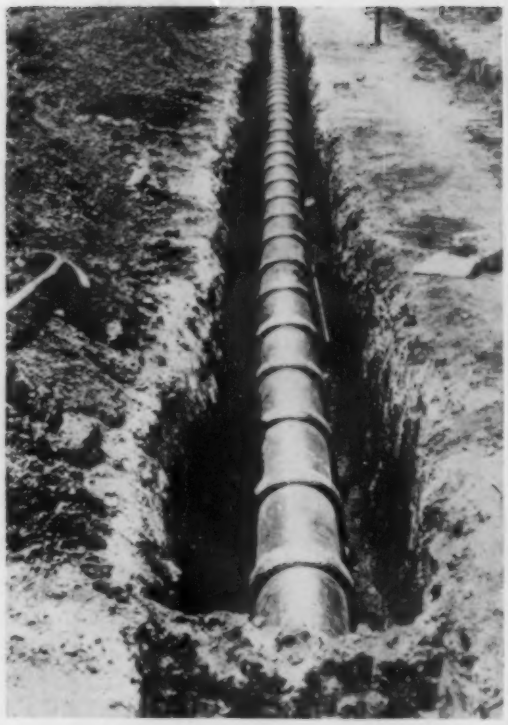
HERE'S DEPENDABLE WATER supply for you—it's Universal Cast Iron Pipe. No hot lead, no cold lead, no lead substitutes, no pouring, no calking. Wrenches were the only tools used in making these tight, flexible, dependable joints—machined iron-to-iron *joints as tight as the wall of the pipe itself.*

Laid anywhere in any season. Thousands of miles installed every year—much of it by common labor—for water supply, fire protection, sewage disposal and other service. Ask our nearest office to show you.



It costs just as much to lay inferior sewer pipe—and a lot more when it's taken up

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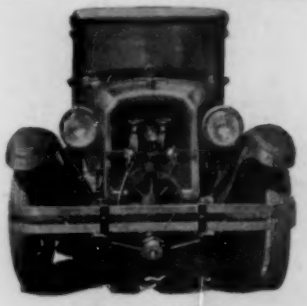

NEW

MANY startling improvements are found in this new Barton Fire Pump. It delivers plenty of water at pressures up to 200 pounds. It drives direct from your car or truck engine (all makes). It primes itself automatically. It pumps water from any available source—under hydrant pressure or at suction. It is real fire protection for any community—with very nominal investment. Write today for bulletin giving complete information and interesting action pictures.

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BATTLE CREEK, MICHIGAN

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New FIRE PUMP

For Dependable Service Installations

***"Wakefield"* Galvanized Amalgamated Lead Lined Iron Pipe and Fittings**

Low Cost—Easily Installed—Permanent

Inquiries respectfully solicited

LEAD LINED IRON PIPE COMPANY
WAKEFIELD, MASS.

"The Engineer was Particular—"

and here's what the Contractor had to say about him:

"—Our superintendent tells us that after the McWane pipe was laid and properly caulked he had no trouble in making tests.

"The Engineer was particular in testing. He would get down in the trench and examine each Precalked joint, and usually took a dry rag and passed it entirely around the joint, and if it showed the least mois'ure the joint would be recaulked. Fortunately for us, he found very few joints that showed moisture."

We like a "fussy" engineer. He does good work himself, demands it in others, and appreciates it in McWane pipe.

He may be hard to convince at first that a lighter pipe can be stronger, a factory-made lead joint better than a trench-made one—

But when he does see it, he's a life convert to "3 times the speed for ½ the labor" (McWane Precalked Joint Pipe).

PRECALKED JOINT PIPE

Sizes 1¼ through 8 inches standard lengths
Precalked Fittings

"We pioneered—and lead—in production of very small cast iron pipe."

McWane Cast Iron Pipe Company
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McWANE CAST IRON PIPE precalked

with the Factory-Made Joint

Youngstown TANKS
STANDARDIZED

60,000 GALLONS OF WATER WHEN NEEDED

This shows a 60,000-gallon elliptical-bottom Youngstown Water Tank on a 100-foot tower, installed for the Standard Pressed Steel Company of Jenkintown, Pa.

Youngstown elevated steel storage looms high on the municipal and industrial horizon today. Scores of installations in all parts of the country are the result of deliberate purchasing judgment.

Our engineers will without obligation furnish free water system plans

The **YOUNGSTOWN BOILER & TANK** ***Company***
YOUNGSTOWN OHIO, U. S. A.

Cleveland's *Newest Waterworks Pump*

FOURTEEN years ago the City of Cleveland installed at the Kirtland Pumping Station a 30,000,000-gallon-per-day De Laval Geared Turbine Driven Centrifugal Pump to operate against a total maximum head of 250 feet. In the official acceptance test in 1914, this pump developed a record duty of 152,000,000 foot-pounds per 1000 pounds of steam. Since then, Cleveland has installed altogether 14 De Laval Geared Turbine Driven Centrifugal Pumps, of an aggregate capacity of 700,000,000 gallons per day.

The latest pumping unit, which is shown above, is installed in the original Kirtland Station, and has a capacity of 60,000,000 gallons per day against 270 feet. The turbine is of the cross compound type, having two shafts connected to pinions driving upon opposite sides of the gear. The compound arrangement makes possible the use of a large number of stages, resulting in the highest steam economy without unduly increasing the length of the turbine shafts, and also makes a better gear design possible.

The Fairmount Pumping Station of the City of Cleveland, which contains 8 De Laval Geared Turbine Driven Centrifugal Pumps of a total of 300,000,000 gallons per day capacity, has been described in a booklet which will be sent upon request.

De Laval
Steam Turbine Company
Trenton, New Jersey

Manufacturers of Steam Turbines, Centrifugal Pumps, Centrifugal Blowers and Compressors, Flexible Couplings, Double Helical Speed Reducing Gears, Worm Gears, Hydraulic Turbines and Special Centrifugal Machinery.

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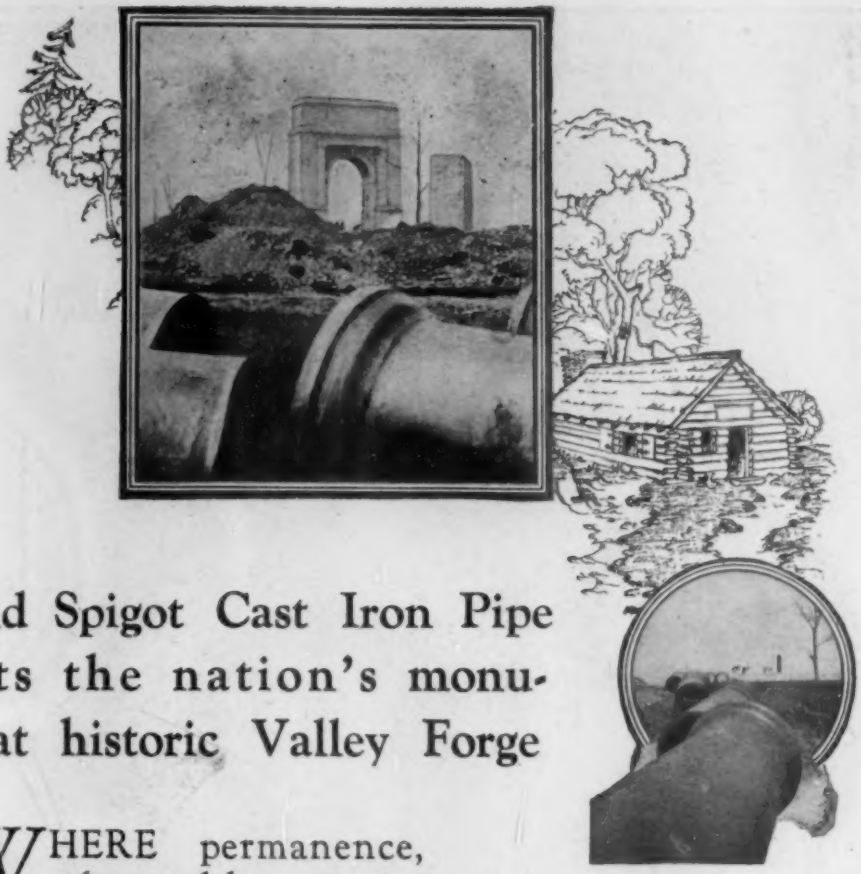
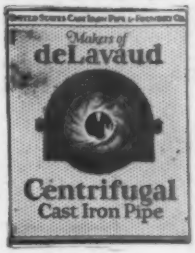


Bell and Spigot Cast Iron Pipe protects the nation's monuments at historic Valley Forge

WHERE permanence, safety and lower maintenance costs are factors, cast iron pipe is specified and used.

Write for new illustrated handbook which contains full specifications and other valuable data for construction engineers.



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THE "American" S. I. pump is a horizontal, split shell, 2-stage pump, furnished with bronze enclosed impellers, labyrinth bronze wearing rings, bronze shaft sleeves, and bronze split glands. The pump has ring oiling bearings with a ball thrust on the outboard bearing to take care of any unbalanced thrust which may occur.

This pump is designed with opposed impellers, which take care of end thrust. The impellers are single suction type, and are hand filed and properly designed to give the highest efficiency possible. The pump is provided with a flexible coupling of the pin and bushing type to connect to prime mover.

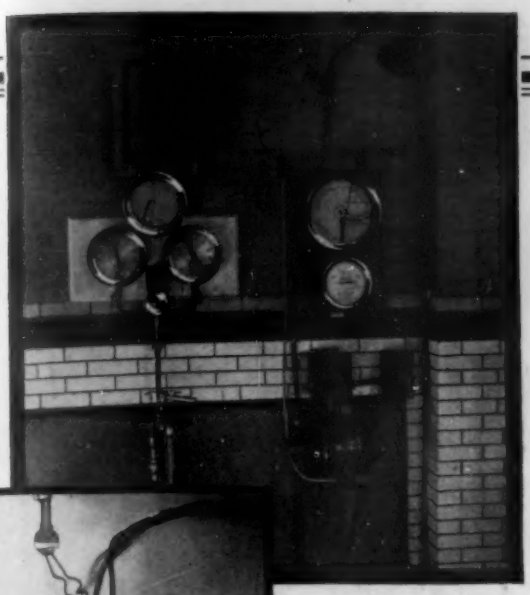
The bearings of the pump are entirely separate from the stuffing boxes which eliminates the possibility of grit in the bearings. However, the reservoirs are large, furnishing a liberal supply of oil. The stuffing boxes are water sealed, so as to insure tight packing without excessive pressure or friction on the revolving shaft.

This pump is furnished in sizes from 1¼ in. to 10 in., capacities up to 4000 g. p. m., and total heads of 500 ft. on the larger sizes and capacities.

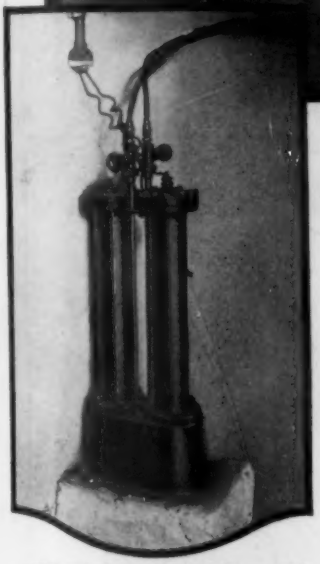
Write for catalogue to the nearest office.

THE AMERICAN WELL WORKS

General Offices AURORA, ILLINOIS *and Factory*



In A Filtration Plant



Meter body located underground outside the building, Evansville Water Works

Water Meter on line of filter beds, Evansville Water Works, Evansville, Indiana

IN filtration plants Republic Water Meters are used to measure the water passing through the filter beds. Thus the operator has a check on the amount of water filtered and a record of operation, giving exactly the time and amount of water used.

The Republic method of electrically measuring flow gives a flexibility of installation. That is, the reading instruments are placed any desired distance from the points of measurement. Many times, they are located in the engineer's office, where he can watch his pumping conditions at all times.

Variation of voltage in current supply does not affect the readings, owing to a patented feature developed exclusively for the Republic Flow Meter.

The oil seal absolutely prevents scale, dirt, oxide, boiler compound or other matter from entering the meter body.

Republic Flow Meters have the well-known accuracy of electrical instruments. The orifice will not wear and scale cannot accumulate on the thin edge; thus accuracy is maintained.

Bulletin "Republic Water Meters" sent on request

Republic Flow Meters Co.

2226 Diversey Pkwy. Chicago, Illinois.

MONO-CAST PIPE

weathers bending strains

FLEXIBILITY and sturdiness have kept this old tree standing for years against strains and stresses that have destroyed its less adaptable fellows.

Flexibilty, sturdiness and adaptability to service conditions enable MONO-CAST PIPE to absorb (and thereby withstand) shocks.

MONO-CAST PIPE is flexible and will therefore deliver service for many years.

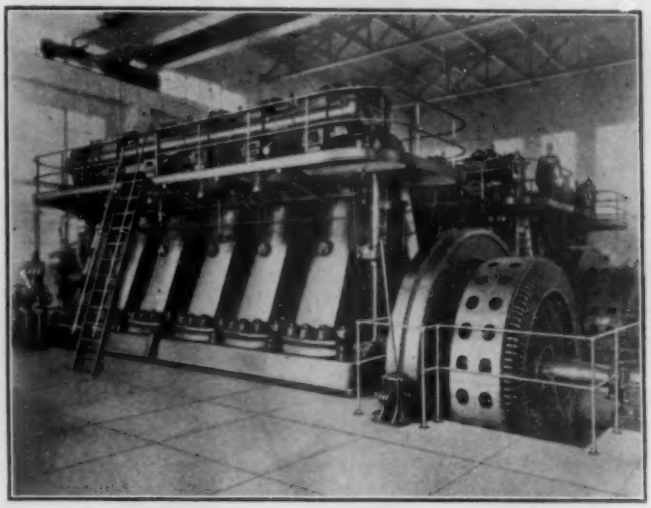
This "bendability" is but one of the dozen points that recommend MONO-CAST to the thoughtful buyer.

Costs Less to Buy
Costs Less to Lay

More than 2,500,000 feet of Mono-Cast Pipe are now in service.

AMERICAN CAST IRON PIPE COMPANY
BIRMINGHAM, ALA.

ACIPCO MONO-CAST CENTRIFUGAL PIPE
BELL AND SPIGOT



12,995,485 K.W.H. at $0.0071575 per K.W.H.

Three 1150-B.H.P. Fulton-Diesel Engines installed for the Bureau of Water Works and Supply at the City of Los Angeles generated 12,995,485 K.W.H. power in one year at a rate of $0.0071575 per K.W.H. This cost divided as:

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Expense	$0.0051504 per K.W.H.
*Capital charges	0.0020071 " "

* Capital charges are based on a conservative estimated engine life of 20 years, and at the official rate of the United States Government, covering investment and amortization.

Let us tell you more about Fulton-Diesel Engines and how they can save you money.

Fulton-Diesels are built in sizes from 50- to 2000-B.H.P.
Full descriptive literature will be furnished upon request

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Successful Engine Builders for Over Seventy-five Years

BRANCH OFFICES:
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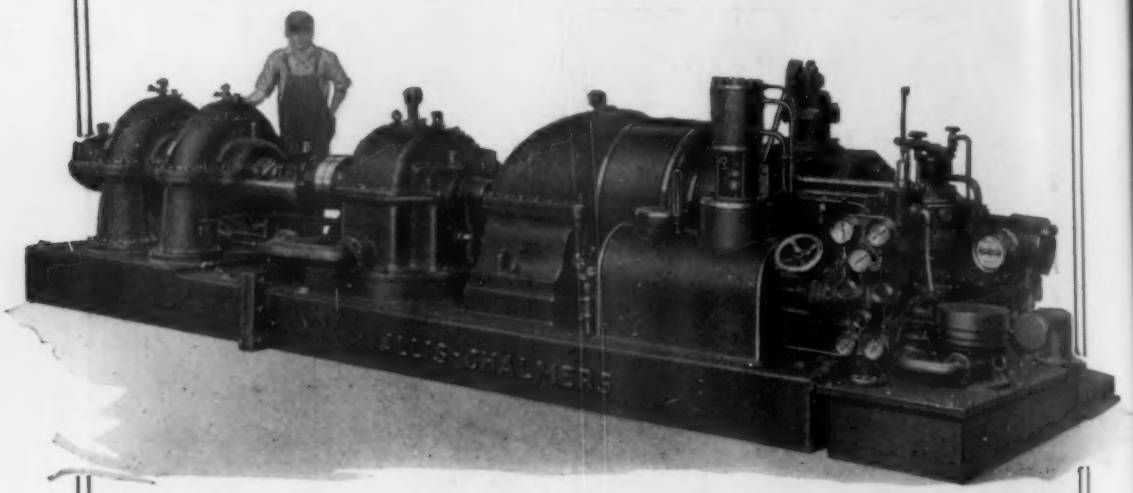
50 to 2000 B.H.P. FULTON DIESEL 50 to 2000 B.H.P.



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Are you interested in building or improving the water works system in your town? Write to the nearest Pittsburgh-Des Moines office for estimates on steel storage tanks or on the complete installation. For over thirty years this company has specialized in building elevated tanks, standpipes, steel reservoirs, filter plants, pumping stations and complete water works systems.

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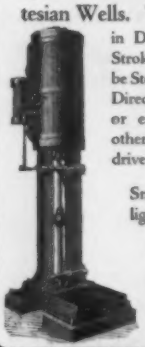

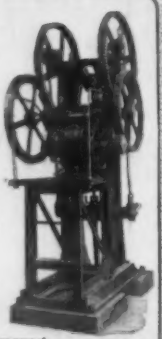

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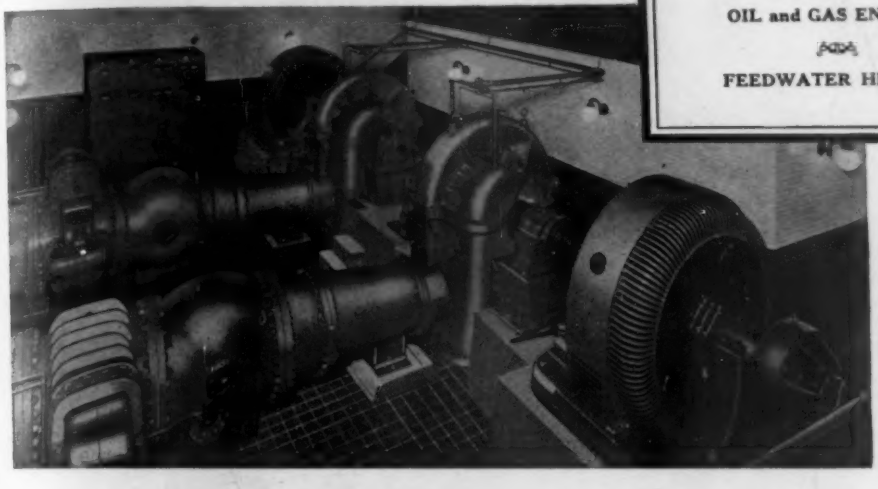

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It was specified that both pumps have the same casing, and be so designed that by changing the impeller of the 50-m.g.d. pump it could be changed to a 70-m.g.d. unit when additional capacity was required.

An overall efficiency of 80 per cent was required in each case with bonus for higher efficiency and penalty for lower efficiency. The time allowed between the letting of the contract and its completion was exceedingly short.

Worthington, upon being awarded the contract, immediately proceeded with the design and construction of the two pumps and of a 10-inch model to be tested in the shop and "similar, hydraulically, to the full-size pump". The model pump was used to determine final details of the full-size pumps already in production and to predict their performance.

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A copy of the complete story about these pumps, as printed in the engineering papers, will gladly be sent on request.

6635-3

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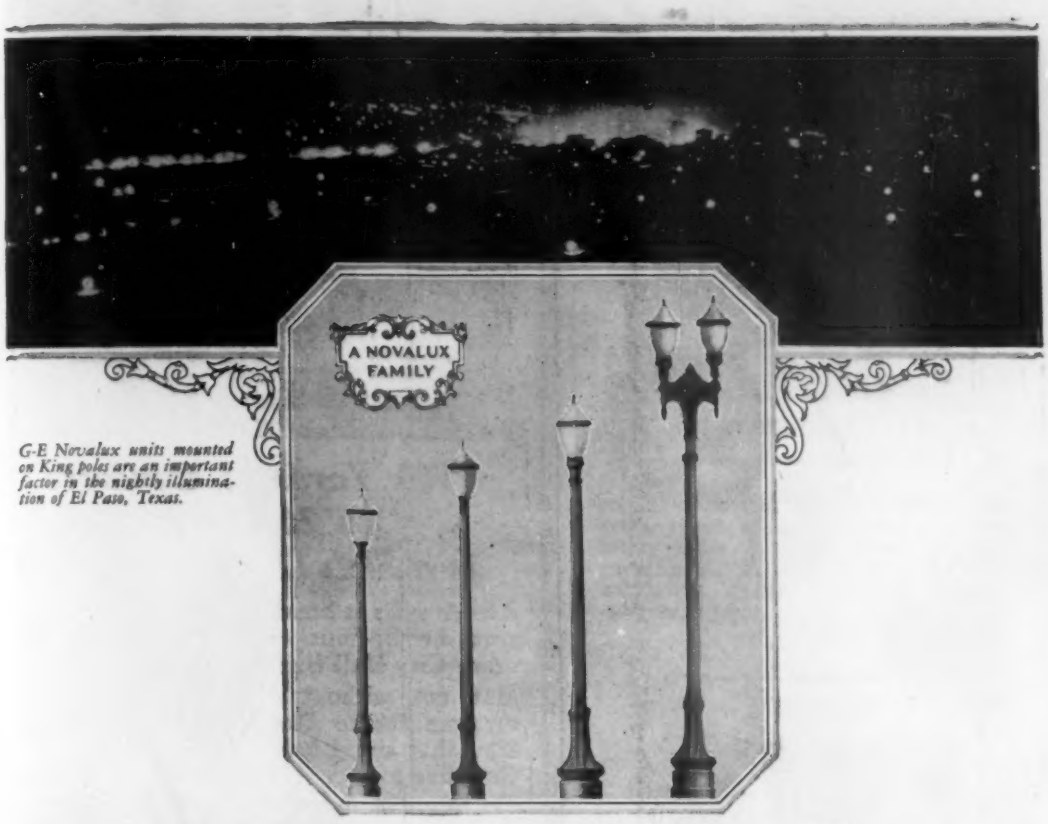

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CELITE

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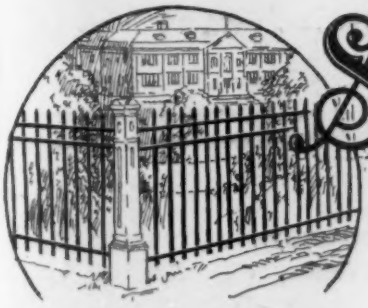

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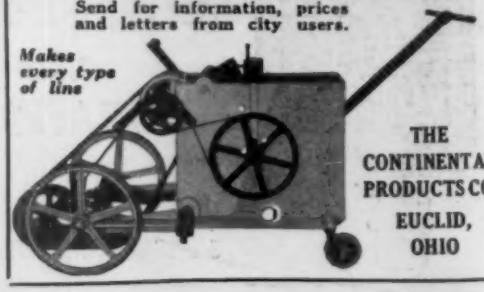

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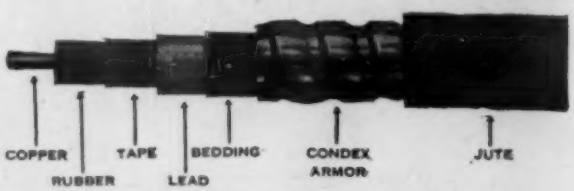

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Hundreds of Parks, Cemeteries and Golf Clubs large and small, now use the Peerless Lawnmower Sharpener

The Peerless Lawnmower Sharpener is the only machine that sharpens all makes of Power, Horse and Hand Mowers scientifically—quickly—perfectly—doing the work as nothing else can. Special Grinding Wheel Attachment for sharpening grass shears, sickles, scythes, etc. Skate Sharpener Attachment sharpens all makes of skates—including hockey. Earns money all the year round. Hundreds of clubs—both large and small—now use the Peerless. Will save its cost the first season. Write for catalog and list of users.

THE FATE-ROOT-HEATH COMPANY
808 Bell Street **Plymouth, Ohio**

A CROSS WORD PUZZLE with a real solution

Traffic problems beget "cross" words—traffic tie-ups try the patience of motorists, pedestrians and "cops" alike. And they prove vexatious to public officials charged with the solution of the city's traffic problem.

But—happily—there is a real solution. There *is* a way to speed traffic, smoothly, quickly, efficiently—a way to stimulate an even, continuous flow, weaving the cross-currents of motor vehicles and pedestrians in and out, with safety and speed.

Ask officials in Chicago, Detroit, Philadelphia, Cleveland, Buffalo, Des Moines, about Tokheim CHRONOPLAN. *They know!* And ask us to send you full information. Your traffic problems can be solved. Isn't it worth knowing how? Just address Department "M".

TOKHEIM OIL TANK & PUMP COMPANY
FORT WAYNE, INDIANA

TOKHEIM
CHRONOPLAN
Traffic Control System

ANCHOR
Electrically-welded
RAILINGS AND GATES
A railing
of strength
and distinction
Remarkably strong—because each picket is electrically welded to the rails at sixteen points.
Distinctive—because of simple, clean-cut lines, unmarred by braces, lugs or rivets.
For full information regarding this Anchor Railing and its features of construction, write for our Catalog 62.
Anchor Post Fence Co.
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PARK BENCHES AND SWINGS

NINE DIFFERENT STYLES OF

BAUSMAN BETTER BENCHES

AND

THE HEAVY PARK SWING

Designed for Comfort, Appearance and Durability; Made from Materials of Quality and Backed by an Experience of More Than a Quarter of a Century.

There is a Bausman Bench for Every Purpose.

BAUSMAN MFG. CO. MILLERSVILLE, PA.

BENCH MAKERS FOR MORE THAN A QUARTER OF A CENTURY

Yes—we should like you to mention THE AMERICAN CITY.

One of the F-M Diesel-Electric units in the Tulia, Texas, Diesel-equipped municipal plant, with two F-M motor-pump units in foreground —equipment that has afforded remarkable economies and profits for the city

Here Diesel-profits pay bulk of plant expansion and city operating costs

Tulia, Texas, first thought that the report of Fairbanks-Morse engineers, predicting that their new F-M Diesel operated municipal power plant would pay for all future extensions of power plant and transmission lines out of profits, was too good to be true. But note what this city has accomplished with its F-M Diesel plant, as reported by City Manager B. B. Huckabee—

"In the year 1923 two 100-hp. Fairbanks-Morse Diesel-Electric Units were installed together with two 500 g.p.m. F-M motor driven pumping units. In the year 1925 it became necessary to install another F-M Diesel Engine unit of 240-hp.

"The first two units were paid for in cash, but the second installation of the 240-hp. unit was paid out of the net profits of the plant. In addition to this a new well with turbine pump and motor has been acquired by the City at a cost of $6,826, same being also paid for out of the net profits of the plant. The City has installed 127 street lights at a cost of $6,268.96 and paid for same out of the plant's profits.

"An entirely new modern transmission system has been built at a cost of $29,517.26. This also has been paid for by the plant. We purchased $1200 worth of fire hose paid for by the light plant. If the City did not own its own light plant, it is safe to say that the cost for purchased current for street lighting would be $400 per month and for pumping $450 per month. This is over $10,000 per year that the light plant should be given credit for.

"The entire operating expense of street department, police, office force, City Commission, salaries, etc. are paid for by the light department. It is also paying for the City's property portion of the street paving. Our net profits are averaging approximately $2,000 per month.

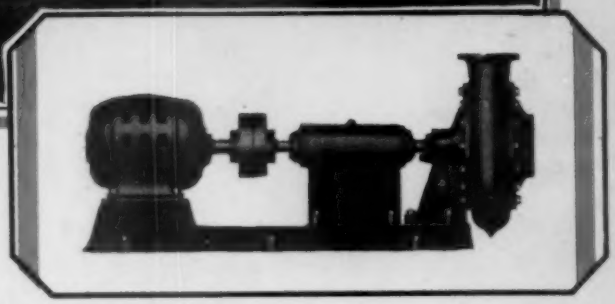
"We could reduce rates considerably and continue to make money, but due to the fact that the light department has assumed the financial burden of all the City's departments, operation as well as improvement cost, it is just as well for us to receive a reasonable price for our service as our rates are lower than the utilities' rates in this territory and at present we are paying out thousands of dollars each year out of light plant profits for other departments of the City that otherwise would come out of the taxpayer's pocket. In conclusion I will state that any municipally owned light plant is bound to be a success providing the proper kind of equipment is secured, excellent service rendered and the proper management given."

Ask for special bulletin showing what the F-M Diesel has accomplished in many municipally owned power plants and water works

FAIRBANKS-MORSE

DIESEL ENGINES · PUMPS
MOTORS · SCALES

Fairbanks-Morse Non-clogging Trash Pumps pumping unscreened sewage in model sewage plant, Wakefield, Mass.



No other pump like it for handling sewage

That was the verdict of the commissioners when they chose Fairbanks-Morse Trash Pumps (A. B. Wood's Patent) for the new sewage plant at Wakefield, Mass. Many pumps were considered, but none met the conditions of service so completely and with such assurance of uninterrupted service as the F-M *Non-clogging* Trash Pump.

A. B. Wood, prominent consulting engineer, invented this pump after years of study and research while solving unusually difficult sewage pumping problems at New Orleans. The pump owes its success to the unique impeller so designed that it will handle any solid material that will pass around the suction elbow. Advanced in every detail even to the finely built ball bearing motor with which it is regularly equipped, the F-M Trash Pump is being specified for pumping unscreened sewage in many new sewage plants which are equipped throughout with the most modern and efficient machinery.

Due to the non-clogging feature, the F-M Trash Pump does away with the use of elaborate screening equipment, simplifies sewage plant design, pumps raw sewage without the usual delays and interruptions occasioned by frequent cleaning, and its efficiency minimizes power consumption.

This advanced pump is one unit of an exceptionally complete line of Fairbanks-Morse pumps covering practically all service requirements. F-M engineers are always available for consultation service on your pumping problems.

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28 branches in principal cities at your service

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PUMPS · DIESEL ENGINES
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AEOPA 50 1

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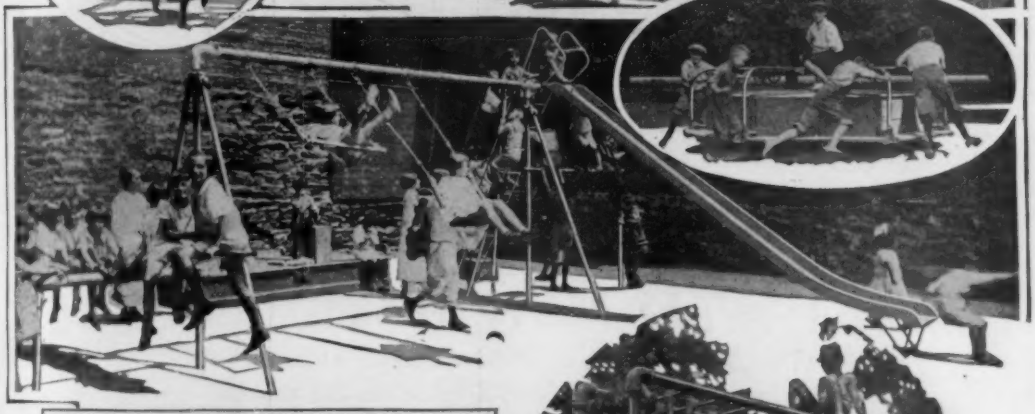
All the Time!

Everwear Playground Apparatus is used the World over, and is noted for its Safety, Durability, Beauty and Playability.



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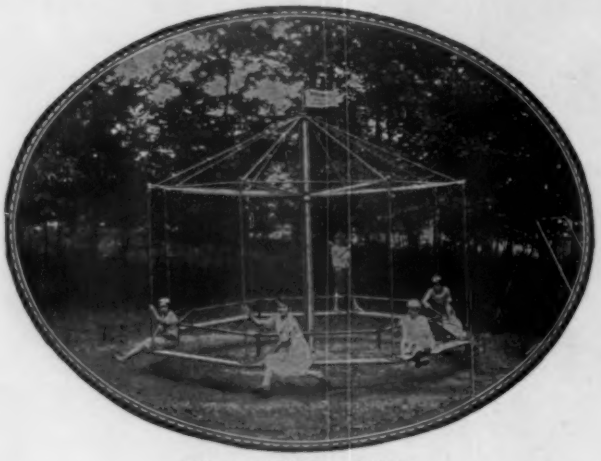
Springfield, Ohio

MORE FOR YOUR MONEY

Than you ever thought possible



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Already the Merry Whirl is scoring the greatest success in our Playground History! And why! Because no other Playground Device of equally low price ever supplied so completely all the amusement and exercise afforded in the Merry Whirl.

REMEMBER
The Merry Whirl

—will accommodate over 50 children at one time
—is the safest Playground Device on the market
—does not need supervision
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—and guaranteed to give satisfaction

Send for the Mitchell "Betterbilt" Catalog today. As you turn its pages, note from the illustrations how strongly and sturdily Mitchell Equipment is built and assembled. Consider our low price and uniformly good design and construction. You will be convinced that it represents an incomparable value involving real economy.

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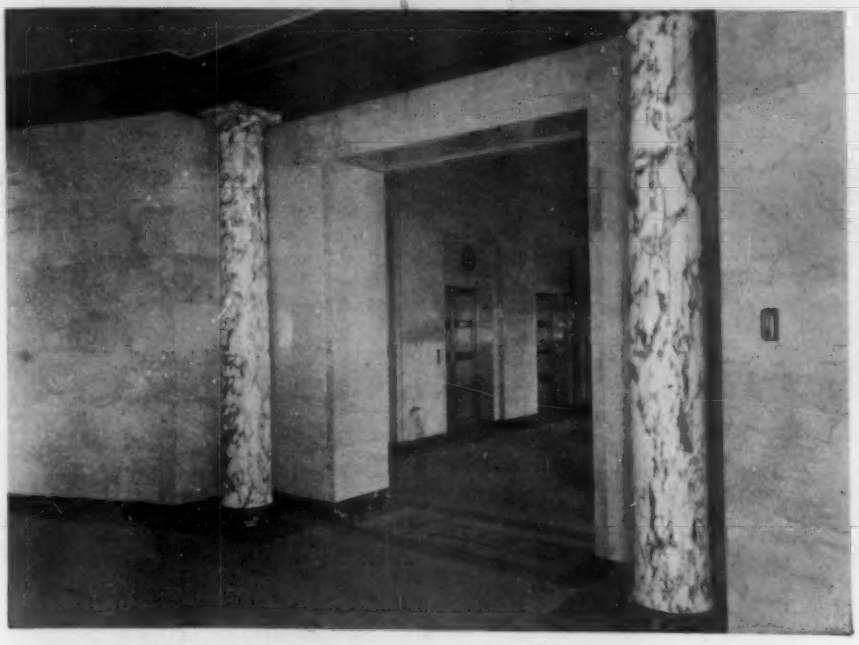

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That MARBLE is a more beautiful material for the interior finish of buildings —that it is more distinctive, durable and sanitary—that it is ultimately more economical from every standpoint—and, finally, that

There is No Substitute for Marble

has been adequately proven by its years of use by those of discriminating taste and judgment.

For evidence of the inherent qualities of marble and its universal adaptability to every type of structure —commercial, civic and residential—send for the illustrated booklet shown on the right.

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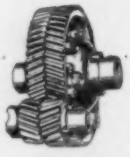
International Trucks are Building Roads and Reputation

THE government of Quebec is using a fleet of International Trucks to blaze a highway through the virgin wilds of the Gaspé Peninsula. The Peruvian government has 54 Heavy-Duty Internationals on the great Olmus Project in the mountains of Peru.

Internationals are owned by hundreds of cities for street maintenance and public works. At the head of the list is New York City, using fleets of them in eighteen Departments and Boroughs. Another fleet of 40 is helping to build the city's new subways through solid rock.

International Harvester builds five sturdy models for heavy hauling—two sizes with double-reduction-gear drive for 2½- and 3½-ton loads, and three with chain drive for 2½-, 3½- and 5-ton loads.



The Herringbone Gears

Among the advantages in this design in the double-reduction drive models is the increased efficiency resulting from the greater tooth surface. Other advantages are reduction of wear—evidenced by a remarkable quietness—and unusual accessibility. The performance of the Heavy-Duty Internationals is due to such developments in International design, the fruit of 23 years' automotive experience.

Besides Heavy-Duty Trucks the International line includes eight types of Speed Trucks, 4- and 6-cylinder, for 1¼-, 1½-, and 2-ton loads; and the sturdy ¾-ton Special Delivery truck. Sold and serviced through 154 Harvester Branches in the United States and Canada, with adequate representation in foreign countries. Folders will be sent on request, and the trucks are on view at the nearest display room.

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Do you mention THE AMERICAN CITY when writing? Please do.

"On the apparatus which we operate, there are at the present time two Firestone Tires 8 years old, four 3 years and two 6 years old. All are still in fine shape. You may be sure that with results like this from Firestone Tires, we will use nothing else."

ELMER L. RHOADES,
Fire Chief, Kearney, Neb.

Gum-Dipped
TIRES for FIRE FIGHTERS

Gum-Dipped Tires are insulated and protected for high-speed fire apparatus. Firestone dips the cords of the carcass in a rubber solution, saturating every fiber of every cord with rubber. This gives the tire extra strength and stamina and makes your equipment more dependable in any emergency.

The scientifically designed Firestone tread has safety angles and wedges which supply powerful traction and minimize skidding even on bad streets and roads. In your locality there is a Firestone-equipped service station where you can obtain the advantages of these better tires, along with helpful, expert service. See your local Firestone dealer.

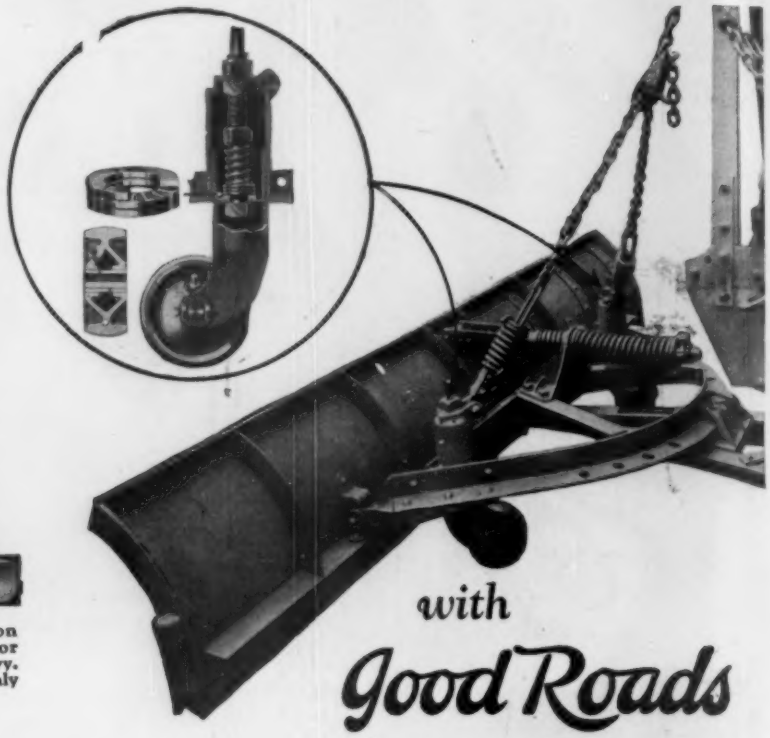
MOST MILES PER DOLLAR

Firestone

GUM-DIPPED TIRES

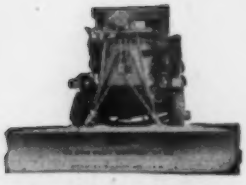
AMERICANS SHOULD PRODUCE THEIR OWN RUBBER Harvey S. Firestone

Snow Removal Costs Less Per Mile

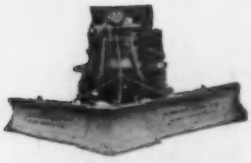


Exclusive Good Roads Feature No. 1

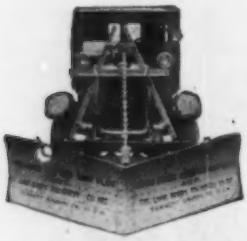
Swivel castor wheels, equipped with thrust roller bearings and Alemite lubrication, assures free action of castor wheel under all conditions.



Good Roads Champion Blade Type for motor trucks—model 11-B heavy. Same plow as 10-C only heavier.



Good Roads Champion High Speed. Adjustable with V-type. Model 21-B for motor trucks. Clears a 14-foot sweep at 20 miles an hour.



Good Roads Champion V-type for motor trucks—model 20.

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When you purchase a Good Roads Snow Plow you buy more than just a piece of equipment for removal of snow. You buy years of experience in the manufacture of snow plows. You buy the best in design and construction. You buy a reputation that must be sustained. You buy what three out of four buy when they order snow plows.

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Good Roads SNOW PLOWS

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A NEW LINE OF—

STREET FLUSHERS, STREET SPRINKLERS, ROAD OILERS AND SPECIAL EQUIPMENT FOR TRUCKS

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Public Officials will be interested in the formation of the Truck Equipment Corporation of Joliet, Illinois, who will specialize in the production of Tank and Special Equipment.

The Corporation's new plant adjoins that of the Farrell Manufacturing Company, who have a national reputation as quality tank builders.

The personnel of the Truck Equipment Corporation is as follows: Mr. D. O. Paulson, President; Mr. C. S. Farrell, Vice-President; Mr. W. I. Jones, Secretary and Treasurer; Mr. C. F. Greenburg, Superintendent.

Mr. C. S. Farrell is President and Mr. W. I. Jones Secretary and Treasurer of the Farrell Manufacturing Company.

Mr. D. O. Paulson, President of the Truck Equipment Corporation, has had a very broad experience extending over a period of fifteen years in connection with the development of street flushers, street sprinklers and truck tank equipment.

Mr. C. F. Greenburg, Superintendent, brings to the company an unusual knowledge in connection with the design and production of this type of equipment, which has been gained through actual experience extending over a period of twelve years.

Inquiries are solicited on street flushers, street sprinklers, road oilers, gasoline truck tanks, pressure tanks, and special tanks of any description.

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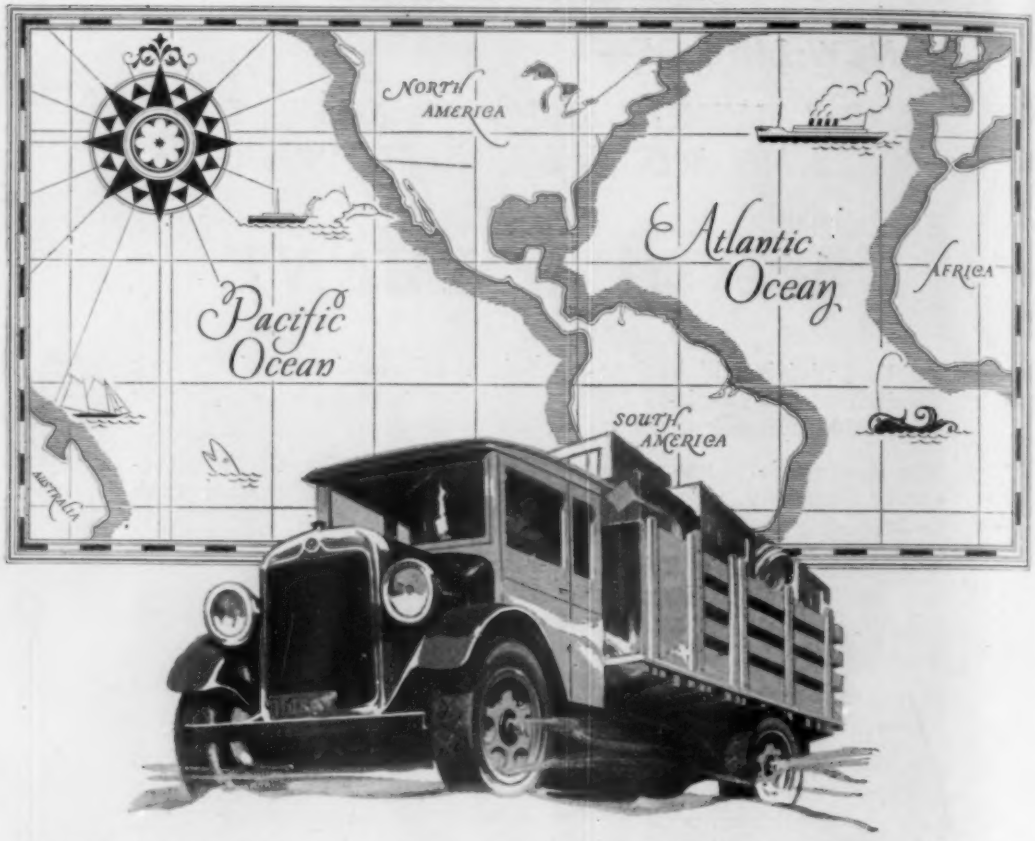
JOLIET **ILLINOIS**

GRAHAM BROTHERS TRUCKS



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Completeness and accessibility of service facilities add definitely to the value of the owner's investment in Graham Brothers Trucks and Commercial Cars—at work throughout the world.

There is a Dodge Brothers Dealer near you with skilled mechanics and genuine repair parts—equipped to give immediate service at low cost. No long layups. No waiting for parts. No costly delays.

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GRAHAM BROTHERS (CANADA) LIMITED, TORONTO, ONTARIO

SOLD BY DODGE BROTHERS DEALERS EVERYWHERE

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No other crawler has a combination of all these advantages; all-steel construction—no cast iron parts; fewest working parts—lowest upkeep cost; patented non-clogging track of specially hardened alloy steel; greater track area—better traction—less ground pressure; oil reservoir type dirt-proof bearings; simple steering — no complicated clutches.

OVER 200 ~ New England Communities USE Trackson-Fordsons *for* Snow Removal !

LAST YEAR, in New England alone, over 200 communities bought Trackson-Fordsons for snow removal, and hundreds of other cities and towns throughout the snow belt have found them an excellent investment for keeping roads open.

The experience of users in Northern Wisconsin, New York, New England, Canada, and throughout the snow belt, has proven that a fleet of Trackson-Fordson snow plow units, costing no more than a larger, heavier and more expensive tractor, will keep more miles of streets and roads open than any other method. Under the most severe conditions with heavy snow falls and deep drifts, and during the worst storms, they have found that these Trackson-Fordson plows will clear the snow quicker and keep the roads open at a lower cost than any other unit.

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Let us send you free, our special bulletin on low cost snow removal. It's yours for the asking—send for it today!

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We can show you a tremendous saving with the use of the BRABAZON SHOULDER MAINTENANCE MACHINE.

Materials mechanically applied. Attaches to your present motor dump-truck equipment.

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Milwaukee is able to show a saving of approximately $500,000.00 per year in their collection work by the use of Highway Trailers and the Highway Method of Collection. Trailers pay for themselves every twelve months.

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There are two big reasons for ARMCO *research*

MOST engineers and officials are acquainted with the movement inaugurated by Armco to "Look under your roads."

These investigations, conducted by experienced and unbiased observers, have recorded in the past six years the performance of many thousands of culverts. These records have proved conclusively that Armco Culverts do endure.

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Forty manufacturing plants throughout the United States and Canada assure you immediate service on drainage requirements, no matter where you may be.

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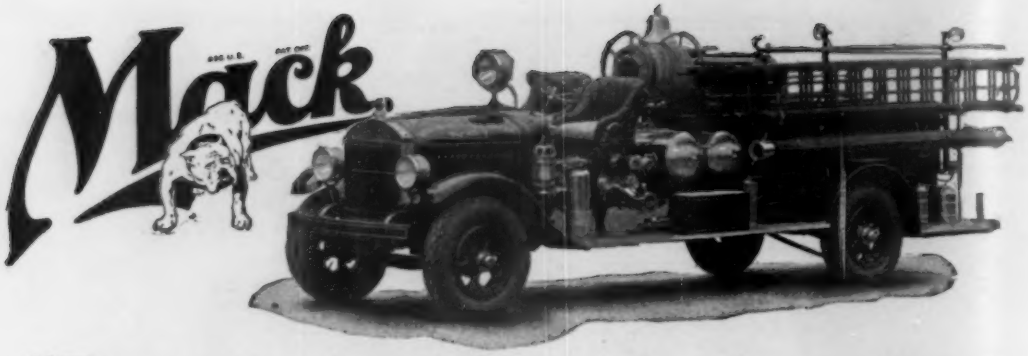

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THIS Mack Type 60—500 Gallon Triple Combination is manufactured by Mack expressly for small communities and townships. It is built to the same exacting standards and of the same fine materials as its larger brothers the 750 and 1000 gallon Mack Bulldogs. Mack makes no compromise in quality no matter what the size of the pumper.

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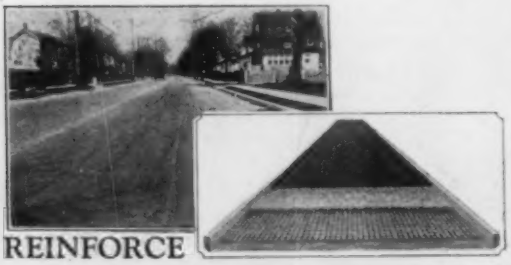

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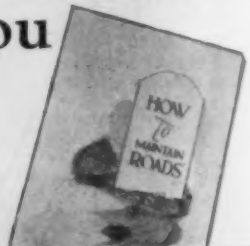

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Successor to

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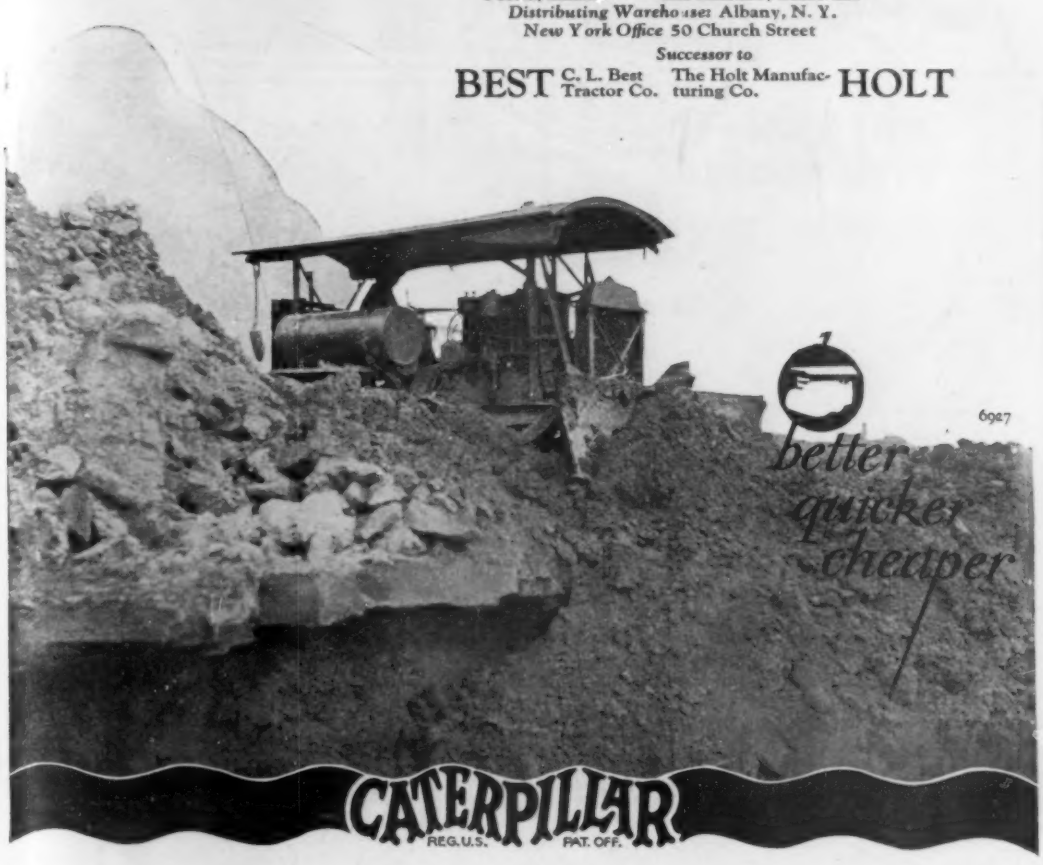

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THE world's largest builder of mechanical hoists and dump bodies in use by municipalities—that is the position the Van Dorn Iron Works Company holds today.

For years municipal buyers have preferred Van Dorn Hoist and Dump-Body units because their operation is positive and trouble-free, because they will haul more loads at less cost, because their life is longer.

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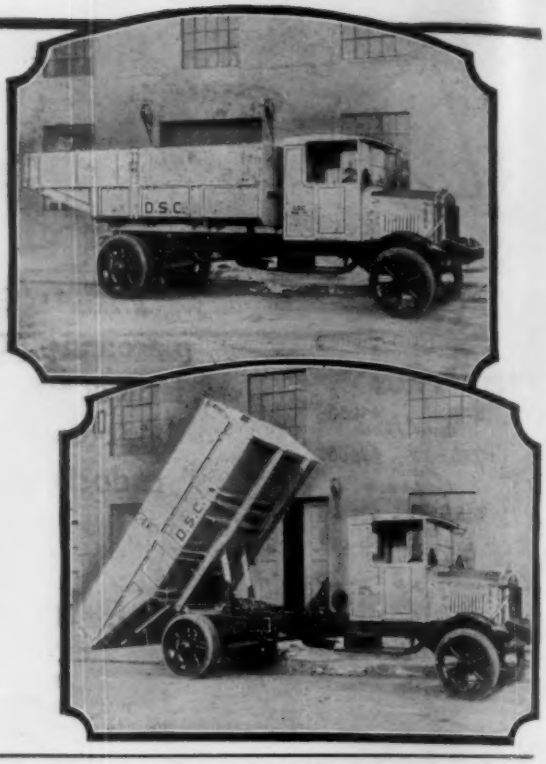
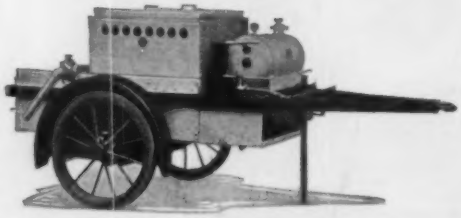
Van Dorn
MASTERCRAFTSMANSHIP IN STEEL



Hot Tools in Five Minutes



No. 90 Oil Burning Tool Heater will give you hot tools in 5 minutes' time. Not only that, but with this handy unit is combined an asphalt-cement melting tank of 50-gallon capacity. For ordinary repair work it makes an extra melting kettle unnecessary. Tool compartment will accommodate more than 15 paving tools. Three oil burners, which can be independently operated, supply intense heat for both melting-tank and tool-heating. Superior running gear. Steel wheels standard. Rubber-tired wheels optional. Write today for full facts and a quotation.

LITTLEFORD BROS.
500 East Pearl Street
CINCINNATI OHIO

When Snow Flies—

remove it quickly cheaply completely

An H. P. "One-Man" Grader

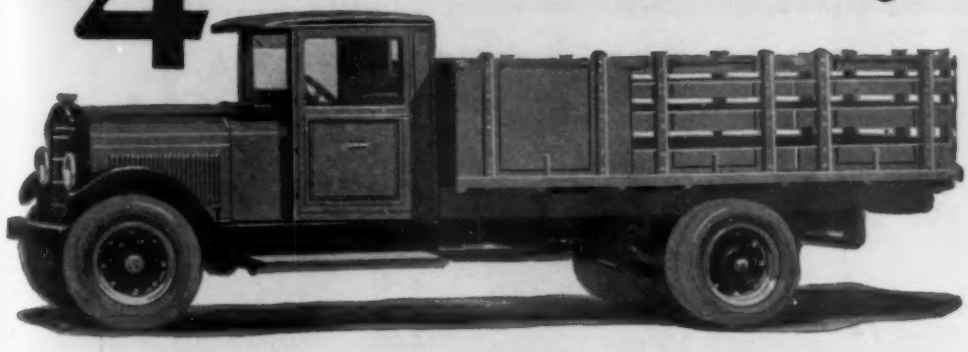
will keep miles of city streets or highways free from snow—at minimum cost.

Moves quickly—turns readily—steers easily and is simple, durable, economical and dependable.

Have an H. P. on hand, ready to clear roads after the first snowfall. Write us today for complete information.

W. A. RIDDELL COMPANY
Bucyrus, Ohio
Successors to The Hadfield-Penfield Steel Co.

The 4th of the NEW Speed Wagons



The Heavy Duty for hauling heavy loads at light load gaits and at light load costs

For Every Trucking Need

SPEED WAGON JUNIOR
Capacity up to one half ton
Chassis
$895
at Lansing

STANDARD SPEED WAGON
Capacity up to a ton & a half
133 in. Wheelbase Chassis
$1345
at Lansing
Also a 143 in. Wheelbase at
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MASTER SPEED WAGON
Capacity up to two tons
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4 wheel brakes

and the
HEAVY DUTY SPEED WAGON
Capacity up to three tons
Dual Internal Brakes
Chassis
$2185
at Lansing

New Four-speed transmission — 6-cylinder Speed Wagon engine—coupe cab—dual rear wheels—dual internal brakes—159-inch wheelbase—single plate clutch—air cleaner—automatic chassis lubrication with Myers Magazine Oilers—thigh-high load platform—completeness of equipment. Plus even more of the rugged durability that has saved thousands of dollars for Speed Wagon owners—

Sold ready for the road

REO MOTOR CAR COMPANY
Lansing, Michigan

SPEED WAGON

for faster, surer, easier, cheaper hauling

NORTH Hydraulic DIGGER

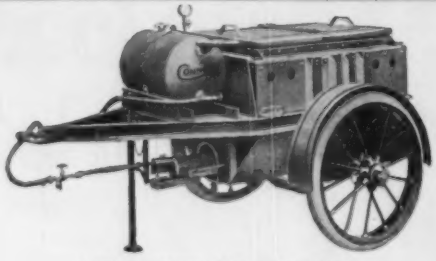
SNOW REMOVAL
At Tremendous Savings

Modern municipalities are meeting their snow removal problems with the NORTH Hydraulic Digger. Loads 300 to 500 yards of piled snow per day. Substantially built. Easy to operate. Powered by Fordson. Equipped with rubber-tired wheels. Designed according to the Hydraulic Principle. No brakes or clutches to get out of order.

Write for complete catalog

W. M. BLAIR MFG. CO.

3673 Michigan Ave., Chicago, Ill.



STYLE "J"
OIL BURNING KETTLE

No need to look further. Here's a kettle that answers all requirements:—low fuel cost, absolute temperature control, quick-heating, non-leakable, roller-bearing wheels and springs, and solid rubber tires if desired. Let us send you our Bulletin "J."

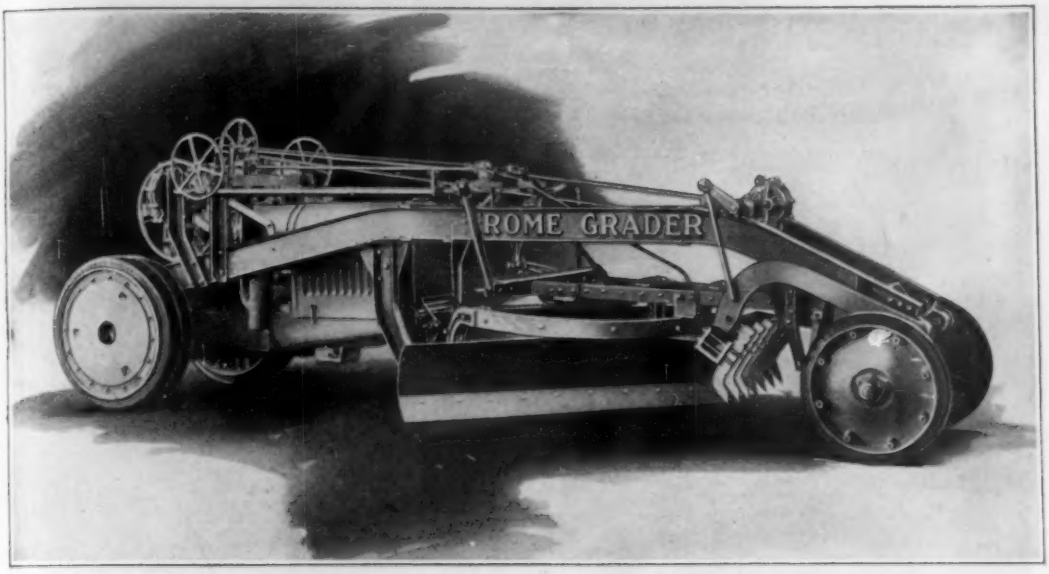
We also manufacture a full line of wood and coal burning kettles; pouring pots, fire wagons, gravel dryers and oil burners. Send for our complete catalog.

CONNERY & CO., INC.

4000 N. SECOND ST. PHILADELPHIA, PA.

Announcing the New

ROME (PATENTED) HIGH LIFT MOTOR GRADER



A Powerful—Practical Road Builder and Maintainer

STRENGTH — WEIGHT — and — PERFECT BALANCE

The above illustration shows an improved ROME Grader, combined with International McCormick-Deering tractor.

The new **ROME HIGH LIFT MOTOR GRADER** with its many improved features, is a further advance in the producing of better and more efficient Road Building Equipment. It carries along a step further the newer ideas that were introduced with the original ROME Grader and, after further improvements, is combined with an adequate and time-tested power unit, the McCormick-Deering tractor. ROME Motor Graders will be supplied with both regular wheel and crawler traction. Great care was exercised in designing so that the completed machine would have necessary weight so distributed as to hold to the work, and still respond quickly and easily to the manipulations of the operating controls.

FRAME: Is made especially strong. The heaviest 8" I-Beams 25½ pounds to the foot are used.

FRONT TRUCK: Is built wide and of sufficient weight to keep the wheels down and at all times in proper steering position. Weight properly balanced at this point avoids skidding and holds the scarifier to its work.

HIGH LIFT: This patented ROME feature is retained in the motor-driven machine, allowing a wider range of operations than were ever before possible with a grader of this type.

EXTRA LARGE CIRCLE: The circle of the ROME Grader is the best yet devised. It is not only immensely strong, but extra large in size. This results in that most important part of a grader — the blade being held in its position permanently and rigidly.

SCARIFIER ATTACHMENT: Can be operated independently or in conjunction with the blade, making it possible to tear up and re-grade in a single operation.

CONTROLS: Operation is simplified and made easier by having all of these within convenient reach of the operator's platform.

TIMKEN BEARINGS & ALEMITE LUBRICATION: These contribute further toward the perfection of this new Motor Driven ROME Grader.

ECONOMY: This is a grader for all-around road work and for snow removal. Makes State, County, Township and Municipal Highway funds go the furthest.

AT THE ROAD SHOW, in Cleveland, Ohio,

January 9th-14th, this ROME Motor Grader will be displayed, along with other items of the ROME line.

Visit CENTRAL ARMORY SPACE A-Y-31

ROME MANUFACTURING COMPANY **Rome, New York** **Dept. No. 2**

It Digs any kind of Snow

which a snow loader must be able to do to be a real machine.

Look at the power in those manganese steel feeding propellers and the biting edge of those toothed conveyor flights!

The Haiss Snow Loader is a powerful digging machine as well as a high-speed loading conveyor. It will handle 5 to 8 yards a minute in dry snow, or break up and load a several-days-old frozen snow pile. The machine is heavy, strong and powerful—a high duty piece of equipment for all-weather use.

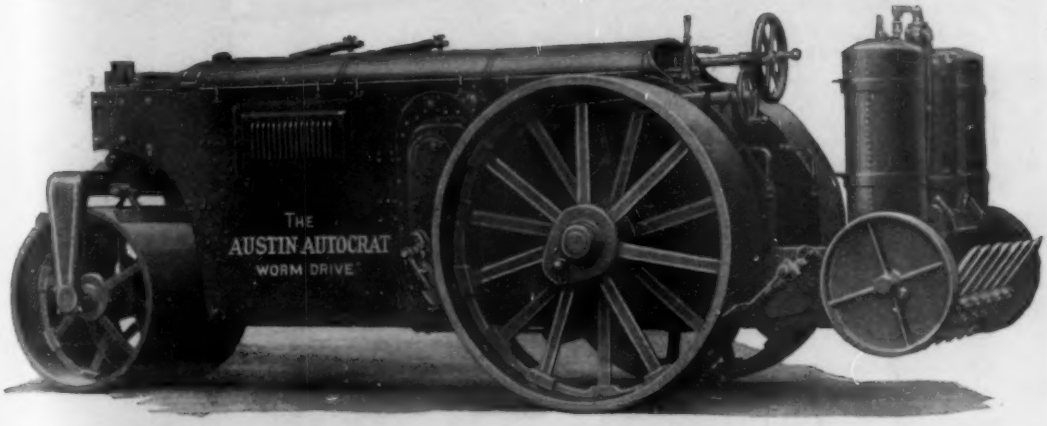
For sand and stone loading you can substitute a standard Haiss Bucket Elevator boom.

Ask for Catalog 727.

HAISS

George Haiss Mfg. Co., Inc.
143rd St. & Rider Ave.
New York City

The New AUSTIN AUTOCRAT

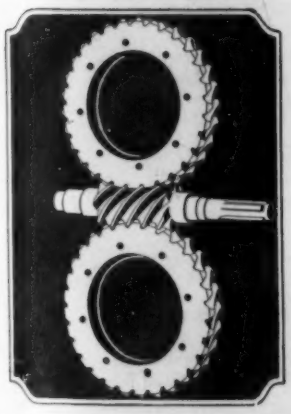


STREAM-LINE—WORM DRIVE

IMMEDIATELY noticeable is the pleasing stream-line design affording the operator unobstructed view of the work of both front and rear rolls. The deep frame side plates, same height front to rear, enclosing power unit and transmission completely, afford a protection from dust, dirt and the elements, as well as against petty thievery of such things as carburetor and magneto.

The outstanding feature of the AUTOCRAT, and the one that places it far in advance of all present motor rollers, is—

The Duplex Worm Gear Drive—



through which the power of the heavy-duty 4-cylinder motor is transmitted to the clutches, thence to the rear axle. New in its application to a road roller, but in almost universal use in the better grade motor trucks. Seven points of superiority:

1. Unexcelled in transmitting power
2. Permits greater immediate speed reduction
3. Simplicity
4. Does not require expert attention
5. Practically fool-proof
6. Silent in operation
7. Free from undesirable vibration

Complete information on this new roller is prepared for mailing. Drop us a line and let us tell you of the amazing possibilities of this great 10-ton roller.

Other Austin Successes

1907
America's first *3-wheeled motor roller*

1911
America's first *tandem motor roller*

1923
America's first *Pup size roller, and now in*

1927
America's first *worm drive motor roller*

THE AUSTIN-WESTERN ROAD-MACHINERY-CO CHICAGO
400 North Michigan Avenue

Send me the full information on the Austin Autocrat
Name .....

HEIL announces the Gettelman high-speed SNOW PLOW for motor trucks

May be installed on any truck of 2-ton capacity or larger. Detachable after original installation in several minutes. Scraper blade 38 inches high, made in 9 and 10 foot lengths.

Write for complete information

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THE HEIL CO.

There is no Substitute for Heil Quality.

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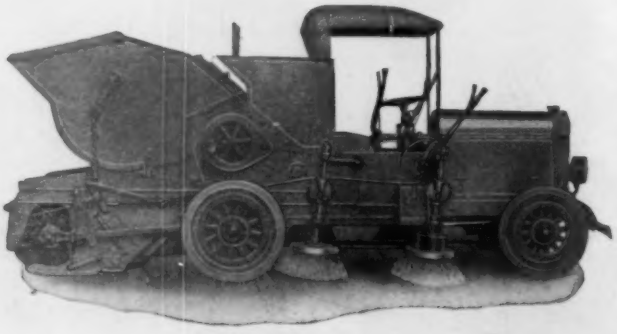
TRADE MARK
REG. U.S. PAT. OFF.

MOTOR PICK-UP STREET SWEEPER



A CLEAN SWEEP—A CLEAN STREET—A CLEAN CITY

Cleanly swept streets are a source of civic pride. They are indispensable to public health and enjoyment. The Kinney-Springfield motor pick-up sweeper covers all the most exacting requirements of up-to-date sanitary street cleaning by the method of sweeping and is the most economical and efficient method of street cleanliness.

Write for our descriptive catalog.

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BOSTON, MASS.

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When You Visit the Road Show at Cleveland January 9-13

COME to Cleveland expecting to find the best and biggest Road Show you've ever attended.

You'll Not Be Disappointed!

And come with full expectations of a special treat from the makers of CLETRAC CRAWLER TRACTORS. Again we say, you'll not be disappointed. Cleveland is the home of CLETRAC. We promise you a royal welcome. Full details at the CLETRAC Booth at the Road Show—and in the Road Show issue of this publication.

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CLEVELAND, OHIO

ACME SNOW HANDLER

It Cleans the Street and Banks the Snow!

The ingenuity of sliding the blade under the snow and curling it to the side in five-foot banks is the successful principle behind the Acme Snow Plow attachment for Acme Pony Rollers and Acme Power Graders.

This machine will clean a 16-foot path through 5-foot snow, or an 8-foot path and bank the snow five feet high on either side. Get the full particulars and be ready for those February snowstorms.

Acme Road Machinery Co., Inc.
Frankfort, N. Y.

STANDARD

COLD PATCH ASPHALT
SOCONY BRAND

For repairing bituminous macadam roads—economically and lastingly.

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Standard Asphalt Binder A *for surface treatment*
Standard Asphalt Binder B *for penetration work*
Standard Asphalt Binder C *for the mixing method*
Standard Refined Mixing Asphalt *for sheet asphalt paving*
Standard Asphalt Joint Fillers, *for brick or block pavements*
Standard Paving Flux, Standard Bridge Asphalt and Preserving Oils

Specifications and all other particulars furnished on request

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TRAIL-IT COMPANY
St. Paul, Minn.

HONHORST TAR HEATERS

"Built for service"

ALL STYLES
Portable and Stationary
25 to 200 gallons

See our page in Street Construction Section Municipal Index for the Kettle you need

or

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THE JOS. HONHORST CO.
1016 W. 6th St. Cincinnati, O.

FAULTLESS FIBER
HUNTSVILLE HICKORY
FOR STREET SWEEPERS

SWEEP IN THE NEW YEAR

and all through the year with HUNTSVILLE HICKORY and it will mean twelve months of satisfaction in your street-sweeping department. And don't wait until you are out of fiber to place your order. You can place advance schedule of shipments for the year 1928 with your motor sweeper manufacturer or direct with us and be guaranteed service and price.

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FRANK H. FORD, President
HUNTSVILLE ALABAMA

Check any other paver with it

Heat-Treated Blades, Buckets, Chute
defeat the abrasive wear of mixing—hold their size and shape—and preserve Rex Speed season after season.

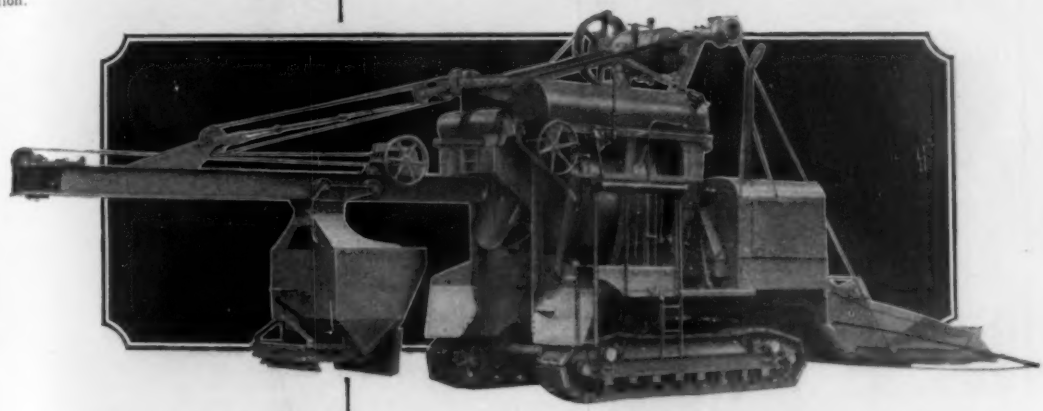
8-Second Discharge
provides the original Rex high-speed action—and establishes the Rex 72 second cycle.

Governor Booster
Speeds up the engine when the skip raises. It increases drum speed—quickening both charge and discharge. And it drops the engine and drum speed back to normal when the skip reaches the end of its upward trip

6-Cylinder Waukesha
provides smooth, vibrationless power—you'll notice the difference on the operator's platform. You can still get the standard 4-cylinder Waukesha if you want it

Timken Bearings
in the speed reduction, drum rollers and other bearings reduce friction and lubrication.

The Finest, Fastest Ever Built



7-Second Water—Accurate to the pint
stops mixing penalties and water hold-ups—and its astounding accuracy meets the most exacting specifications.

Unit Power Plant
incorporates engine and speed reduction into one compact, high-speed unit—this is truly automotive construction.

Unified Action
can add 40 minutes to the paving day by permitting charging and discharging to be handled at one time.

Foldback Top
goes up and down easily and quickly—it's simple and it's power operated.

NEW contributions to even faster operation and still longer life—plus all the speed that made Rex Pavers fast and famous make the New and Greater Rex 27E truly stand out as The Finest, Fastest Paver Ever Built. Check the side column and compare other Pavers with the Rex. If you're interested in more yards per season—and more seasons—send for your copy of the Rex Paver catalogue today.

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(Reg. U. S. Pat. Off.)

If you have a dumping problem!

Wood Dumping equipment is the answer. Wood builds hoists and bodies for every purpose.

Hydraulic Hoists—3 Types

UNDERBODY
VERTICAL
HORIZONTAL

MECHANICAL HOISTS
HI-LIFT HOISTS
SELF-DUMPING HOISTS
STEEL DUMP BODIES

12 standard designs, special bodies built to order when specified

Meet us at the Good Roads Show, Cleveland, January 9-13, 1928

Catalog and all the facts upon request

WOOD HYDRAULIC HOIST & BODY COMPANY

Worlds Largest Builder of Dumping Equipment

DETROIT, U. S. A.

BUFFALO-SPRINGFIELD ROLLERS

All Types and Sizes
With or without Scarifier attachment
Helps you finish the job on time

Send for Catalog A

for complete information

The Buffalo-Springfield Roller Co. SPRINGFIELD OHIO

WHEN WINTER COMES

You can clear snow from streets very rapidly at low cost with a good Galion Motor Grader.
Get your grader now, in time to grade and level your unpaved streets—then when snow comes you'll have the grader ready for clearing streets—year-'round service.

Prompt shipment from stock. Write or wire today.

The Galion Iron Works & Mfg. Co.
Galion, Ohio

GALION MOTOR GRADERS

Do you mention THE AMERICAN CITY when writing? Please do.

STOP, *Start and Steer* BETTER

FOUR small points of contact where tires and pavement meet, four little areas of only a few square inches each—yet how important they are to the safety of motor travel! You cannot stop, start or steer your car efficiently without perfect contact of tires and pavement. Good *traction* is the first requirement of modern streets.

Portland cement concrete pavement provides the ideal surface for rubber tire contact. While always smooth and even-surfaced for riding comfort, the gritty finish affords gripping, non-skid traction even to tread-worn tires. Concrete streets are *safest*—wet or dry!

Your city needs more streets of clean, smooth, lasting, *safe* concrete.

PORTLAND CEMENT
CONCRETE
for permanence

Motorists everywhere prefer concrete roads. They have learned that concrete means safety, on mountain grade or level highway, comfortable travel and arrival on schedule, rain or shine. There are now more than 47,000 miles of concrete road in the United States. And concrete streets now insure safe travel in more than 3,500 American cities. Write for the illustrated booklet which tells of their satisfaction.

PORTLAND CEMENT ASSOCIATION
33 West Grand Avenue
CHICAGO

G-W WAGE$AVER Street Ice Leveler operated by City of Glens Falls, N. Y.

Does more work than 100 men!

"THE G-W WAGE$AVER Street Ice Leveler dug out more ruts yesterday than would have been broken up by 100 men with picks," said Surveyor Daniel F. Cronin of Manchester, N. H., last winter.

"I consider it one of the best pieces of equipment we have," writes E. W. Rogers, Superintendent of Streets, City of Fitchburg, Mass.

Other municipal officials are equally enthusiastic.

Keep your streets open for automobile traffic this winter! Get the facts on this effective, wage-saving ice-leveling equipment.

Cuts out the humps between the wheel ruts. Leaves a level street, slightly corrugated to provide a sure footing for automobile tires. Easily operated. Inexpensive. May be tractor-, truck- or horse-drawn.

Write for Bulletin 1027

It contains complete information, photographs and specifications. Address your letter to nearest office below.

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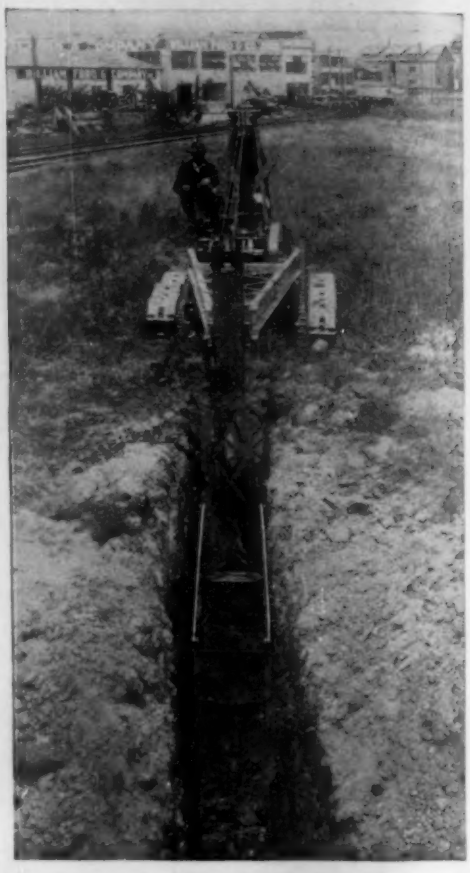
38 Hill Street, Hudson, N. Y.
New York: Graybar Bldg., Lexington Ave. & 43rd Street; Chicago: 565 W. Washington Street; San Francisco: 1274 Folsom Street.

Gifford-Wood WAGE$AVER
STREET ICE LEVELER

WILFORD



WILFORD TRENCH HOE A MONEY-SAVER

Now you can have Wilford economy for trench digging. Digs a clean fourteen-foot trench—in a surprisingly short time. Trench hoe boom is interchangeable with booms for power shovel, crane, clamshell, dragline, backfiller and goose-neck crane. Fordson power, economy and universal service. Bulletin No. 7 gives full information. Copy sent cheerfully on request.

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WILLIAM FORD, President
Detroit, Michigan

Ferry Street, La Crosse, Wis.

Asphalt Penetration Macadam constructed in 1917 with

Stanolind Paving Asphalt

This road is in excellent condition after ten years of service

Asphalts for Every Purpose

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For Sanitary Engineers, Water Works Engineers, Sanitary Chemists, Water Analysts, Biologists.

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Fourth Edition

Rewritten and

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The MICROSCOPY of DRINKING WATER

By the late GEORGE CHANDLER WHIPPLE
Revised by Gordon Maskew Fair and Melville Conley Whipple

FIRST published in 1899, this book has been in continuous demand and now appears in a thoroughly revised fourth edition. During the ensuing years a vast amount of research and study has been given to microscopic organisms in water. Biologists, chemists, and engineers, have all contributed to the progress achieved. Increasing amounts of money and effort are being expended to make water palatable as well as safe. To note these advances in the field, the revisers have brought out this new edition.

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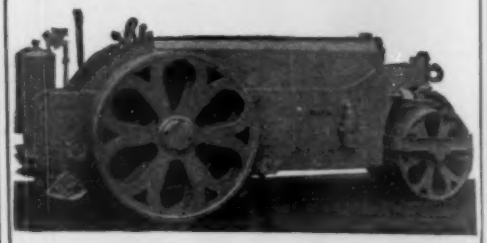
4-CYLINDER
MOTOR ROLLERS

Four cylinders—four sizes (5 - 7 - 10 - 12 tons). Look to Huber for easy single-lever control — short turns — quick action — low upkeep — unusual dependability. The Huber is endorsed and used by leading contractors everywhere. It will be worth your while to send for free catalog giving full mechanical details.



THE HUBER MFG. CO.
305 E. Center St. **Marion, Ohio**

796 FEET ABOVE BROADWAY

AN AHRENS-FOX RECORD

Inside the Fire Lines—Ahrens-Fox Piston Pumpers are known as the Hard Hitting Pinch Hitters.

ASK THOSE WHO KNOW

The Ahrens-Fox Fire Engine Co.
Cincinnati, Ohio

Mention THE AMERICAN CITY—it helps.

Elverson Building, Philadelphia, Pa.

For speedy concrete construction rely on

SOLVAY CALCIUM CHLORIDE

It cuts the setting time in half—sets at the bottom as fast as at the top—gives 7-day strength in 48 hours—gives earlier initial, and greater final strength; can be used with any brand of cement and by common labor.

The saving of time means greater profits to the contractor and quicker returns to the owner on his investment. Its use is particularly desirable in all floor finishing. Solvay-treated concrete can be finished within 3 hours after pouring.

Floors poured late in the afternoon can be finished without overtime. Also the plasticity of the mix produced by Calcium Chloride enables each finisher to do at least 25 per cent more work. These features alone saved over $6,000 on one construction job.

Solvay Calcium Chloride is carried in stock at 75 conveniently located distributing points, assuring prompt shipment and minimum transportation charges. Bags contain 100 pounds—drums contain 375 pounds.

Send for booklet 1053

"Solvay Calcium Chloride in Concrete Construction"

SOLVAY SALES CORPORATION

Alkalies and Chemical Products Manufactured by The Solvay Process Company

40 Rector Street **New York**

Motorcycle Protection at 7/10¢ per Mile

Ten Merits of *Indians*

1. Continuity of service
2. Low operating cost
3. Low maintenance cost
4. Five distinct models for every police need
5. Removable cylinder heads
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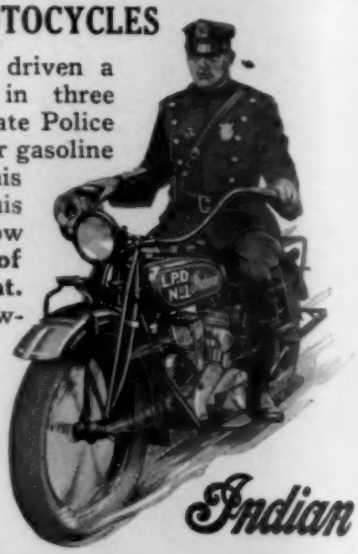
7. Unit power plant
8. Left-hand throttle control
9. Scientific distribution of weight
10. Universal approval

INDIAN POLICE MOTOCYCLES

25 Indian Scouts were driven a total of 81,503 miles in three months by one of our State Police patrols. The total cost for gasoline oil and repairs over this period was $751.14. This gives the astoundingly low average **cost per mile of less than 7/10 of a cent.** Insist on Indians for low-cost efficient police service. Let us send you facts and figures on Indian operation and maintenance.



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Springfield Massachusetts

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Makers of Police Motorcycles Since 1901

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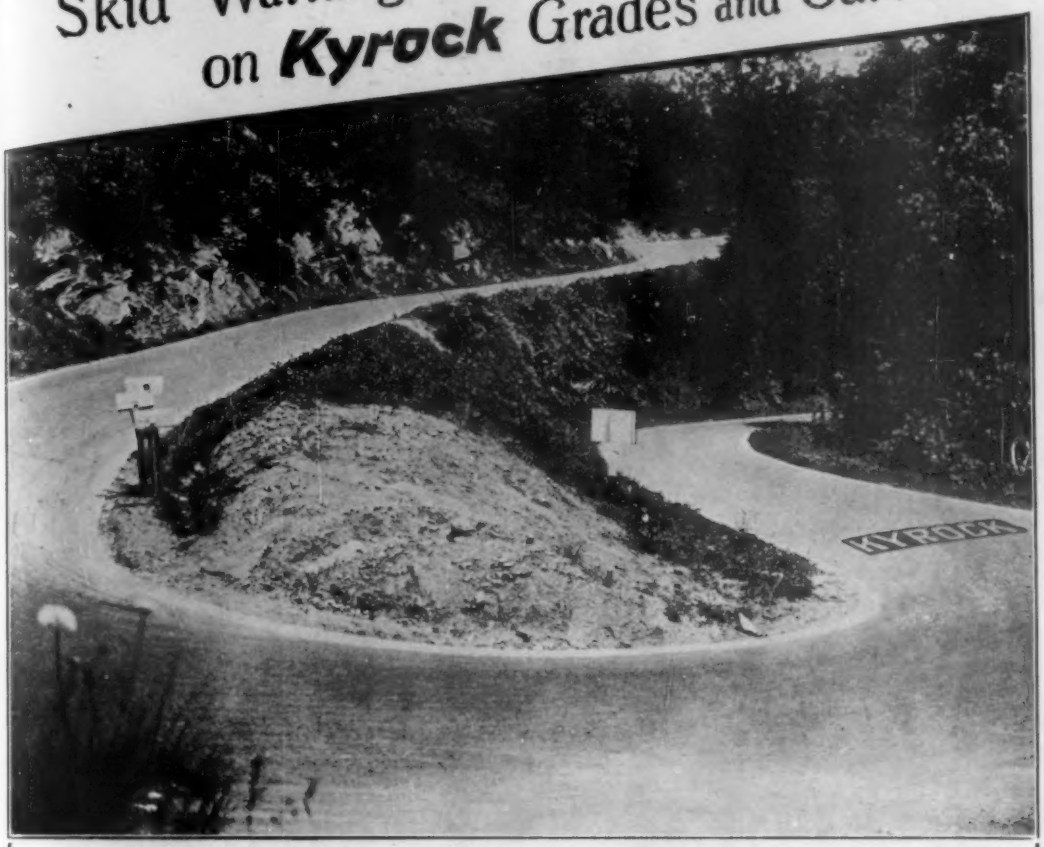
Skid Warning Signs Unnecessary on *Kyrock* Grades and Curves



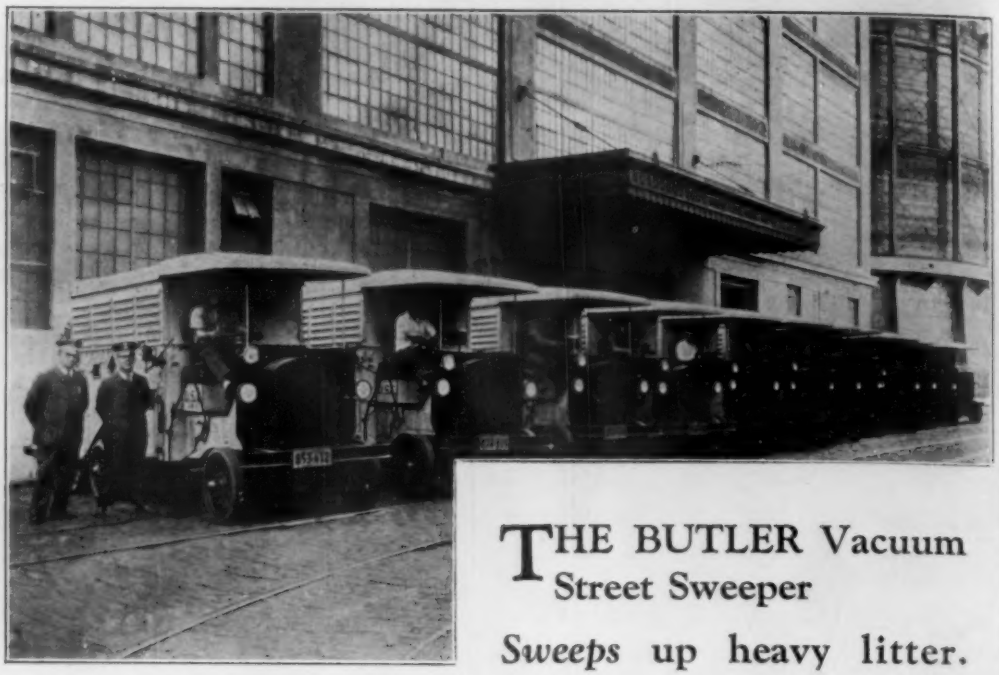
Haw Creek Road, Buncombe County, N. C. Kyrock surface laid by County forces on macadam base. Road built 1925. Photo 1927.

KYROCK presents a sandpaper-like surface of fine silica sand that, wet or dry, affords ideal traction for rubber tires. A Kyrock road *does not become slippery when wet. Investigate Kyrock.*

KENTUCKY ROCK ASPHALT CO., *Incorporated*, Louisville, Ky.

Kyrock
The **Perfect Pavement**

KENTUCKY ROCK Kyrock ASPHALT



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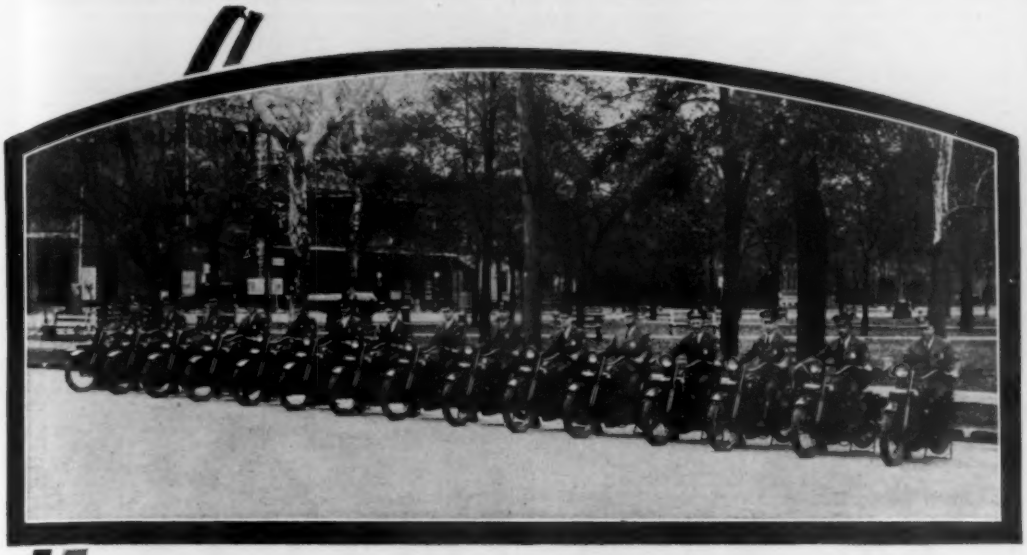


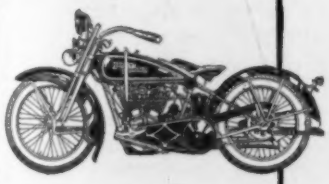
"The Most Economical— Performs Wonderfully"

—says Chief Gill

AFTER trials with other makes of motorcycles the police department of Columbus, Georgia was equipped with Harley-Davidson.

M. D. Gill, Chief of Police of Columbus, writes—

> "I have tried a number of other makes of machines and find that the machines we are now using (Harley-Davidson) are the most economical. We are using the big "74" inch motor and find it equal to any situation that might arise. The machines perform wonderfully.
>
> "The maintenance of the Harley-Davidson is minor when compared to other makes of machines that were used under the same conditions. We have had other companies underbid the Harley-Davidson, however, we felt that it would be far cheaper for us to purchase the machine with the lesser upkeep cost."



The 1928 Twin has many great features. Waterproof ignition unit, throttle controlled motor oiler, front and rear wheel brakes are standard equipment. Ask your Harley-Davidson dealer for a demonstration.

More than 2900 police departments are now using the Harley-Davidson. Remember this fact when considering the purchase of motorcycle equipment.

Write for special police literature.

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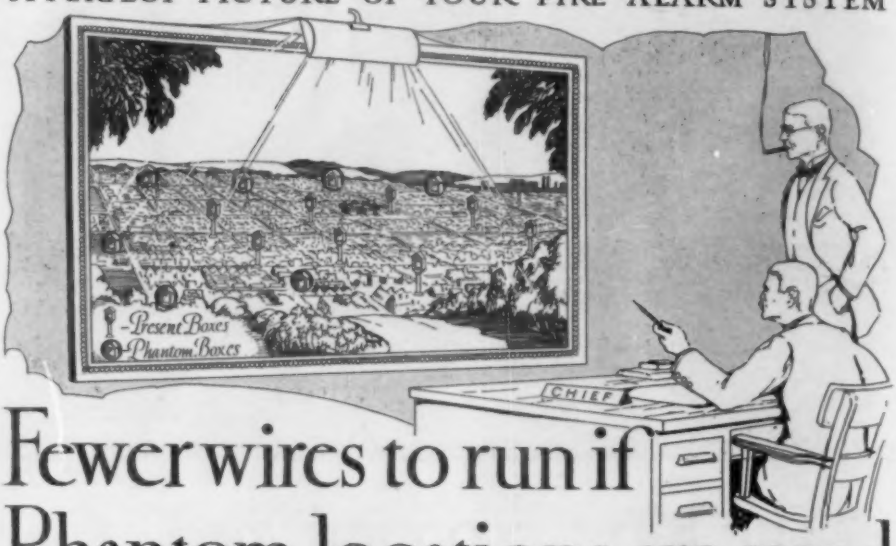
Motorcycles

A PERFECT PICTURE OF YOUR FIRE ALARM SYSTEM



Fewer wires to run if Phantom locations are used

Give a number to every street corner in your city which has no fire alarm box. Consider such corners as being equipped with "Phantom Boxes." When a telephone alarm is received, transmit that number.

A YEARLY PROGRAM

By installing a definite number of boxes each year in the more important locations of "Phantom Boxes," you will soon have adequate box protection and the assurance that adequate protection will be maintained as the city grows.

The "Phantom" Box Plan gives you a perfect picture of your fire alarm system. A glance shows both your present fire alarm boxes and those that will be needed during the next ten years.

Where this method is used you can plan your circuits, either overhead or underground, in advance, so as to save money when fire alarm boxes are actually installed. Cables, with an adequate number of conductors to take care of all the "Phantom" locations, can be provided. Junction boxes can be placed at the "Phantom" locations, so that fire alarm boxes may be connected easily later on without the necessity of cutting the cables.

Test posts can also be connected to underground circuits at "Phantom" locations to serve there until such time as a fire alarm box is needed. It can then be replaced easily with a fire alarm box. A sufficient number of laterals can also be provided to take care of future extensions to "Phantom" locations, without the necessity of digging up newly laid pavements.

The Gamewell Company

Newton Upper Falls, Mass.

"A Box A Block"

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by

AMERICAN-LAFRANCE FIRE ENGINE COMPANY, INC.

and

Foamite-Childs Corporation

EFFECTIVE November 15, 1927, the American-LaFrance Fire Engine Company, Inc., of Elmira, N. Y., have acquired the assets and good will of the Foamite-Childs Corporation of Utica, N. Y., and the business of the two companies will be combined under a single corporate identity. The name of the company will be the American-LaFrance & Foamite Corporation.

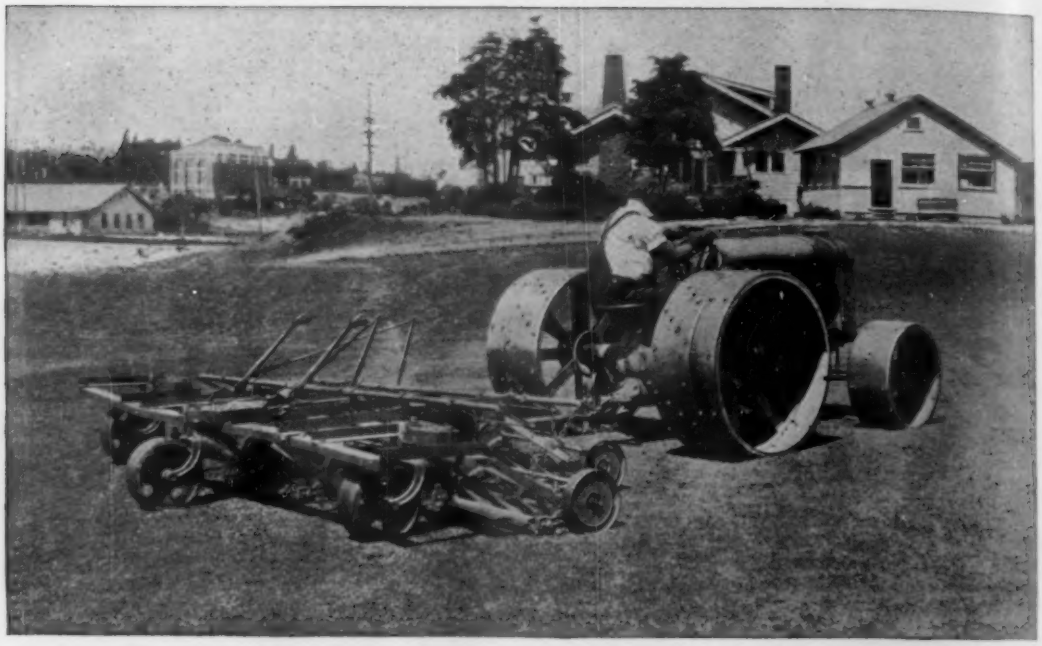
For 82 years American-La France has been recognized as the leader in the development and production of modern fire-fighting equipment. More than 90% of the fire departments of this country are using American-LaFrance motor apparatus, extinguishers, and accessories. Also in industry, American-LaFrance represents the standard in scientific, dependable fire apparatus.

With long, successful experience in the manufacture of motor fire trucks, the American-LaFrance Company has also produced a complete line of heavy-duty commercial motor trucks which have gained recognition in every industry.

Foamite-Childs Corporation has been successful in the manufacture and distribution of certain types of fire protection equipment. They have developed the modern foam method of fire control (Foamite Protection) now widely used for safeguarding industrial, municipal, marine and private property.

THE combining of these two successful organizations brings under centralized direction and operation a body of engineering experts whose specialized experience makes possible a breadth and completeness of service never before approached.

The combination, AMERICAN-LAFRANCE & FOAMITE CORPORATION, will maintain sales offices and engineering representatives in all the principal cities of the United States and Canada. Affiliated companies will operate in foreign countries.



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IF you expect to purchase new Fairway Mowers before spring it will pay you to investigate the advantages of the Ideal Bulldog Fairway Mowers.

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Summed up in the above paragraph are the advantages that the Ideal Bulldog provides. All of them are important factors in considering mowers for golf fairways.

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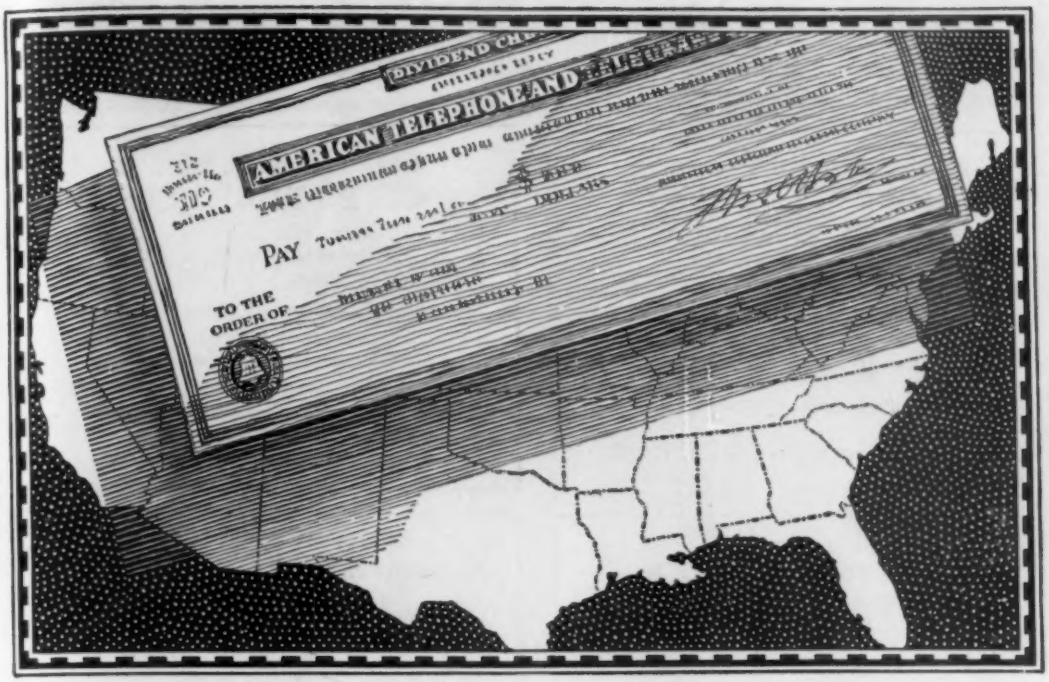

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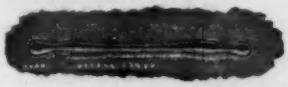

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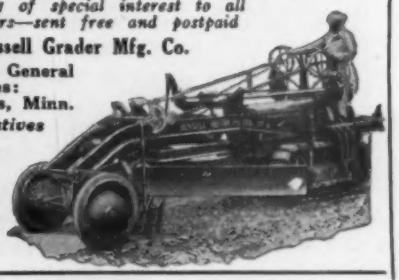

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